RAILROAD GAZETTE

FRIDAY, OCT. 31.

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Contributions.

The Sykes Patents.

SWISSVALE, PA., Oct. 24, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reference to the question of the ownership of the Sykes Signal Patent in this country, which constitutes the subject of an item in your issue of Oct. 17, a correct statement of the facts may be briefly made. Before procuring his United States patent, Sykes sold his United States right to Frederick Cheesewright, of London, to whom the patent was issued. In 1881 Cheesewright sent D. M. Yeomans to this country as his sole agent, with power to sell the same, and the authority was in writing and the writing was recorded in the United States Patent Office. In March, 1882, the Union Switch and Signal Company purchased the entire right from Yeomans, who gave a full and complete assignment, which also was recorded in the United States Patent Office.

If somebody will please tell us how Sykes or his company, after thus selling his patent to us in 1881, could again sell it to somebody else in 1889 and make a valid transfer, some new light may be thrown thereby on the nature of commercial transactions.

In the suit referred to we have set up these matters by way of defense, and the suit is awaiting the action of the opposite party. It is now their "lead."

THE UNION SWITCH & SIGNAL COMPANY,
By E. H. GOODMAN, General Manager.

The Illinois Rules for Crossing Signals.

State of Illinois,
Office of Railroad and Warehouse Commission,
SPRINGFIELD, Oct. 27, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your editorial (Oct. 17) on the rules issued by this commission over my name, I believe that, had you examined the rules carefully, you would find your criticism unwarranted.

For, answering your first point, had I intended the derail to be 300 ft. from the intersection in all cases it would have been unnecessary to mention the fouling point. But for the very reason you mention—*i. e.*, that the angle of crossing governs the distance of fouling point from the actual intersection of rails—I state that derail must be measured from fouling point.

Your second point, concerning location of home signal, I think poorly made. If I had not first described the location of derail . . . as being 300 ft. beyond or from the crossing your point might be well taken; but having said that the derail must be 300 ft. from crossing, etc., I continue with the location of signals beyond derail which has seemed perfectly plain and possible of only one construction, namely, 350 ft. from fouling point.

Rule 8 is evidently misunderstood by you. A detector bar is understood to be part of all derails, and must be operated with the first and final interval of the stroke of lever operating derail. The provisions of rule 8 are for points where no derail is used, and is found necessary to prevent the possibility of conflicting signals at double-track crossings. This detector bar placed on opposite side of crossing from derail, as plainly stated in requirements, prevents targetman from moving derail and freeing signal until train has cleared crossing.

I have submitted rules to persons interested in the constructing of interlocking plants and they seemed to understand perfectly the provisions of the rules.

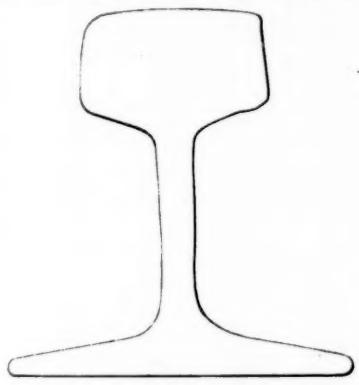
CHAS. HANSEL.

[So after all it is a question of the language of the rules and not of their intent. As we surmised, we entirely agree with Mr. Hansel.—EDITOR RAILROAD GAZETTE.]

Rail Sections as Affecting Wear and Corrosion.

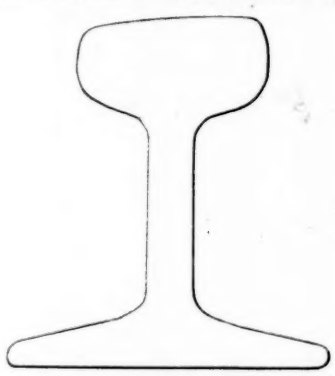
TO THE EDITOR OF THE RAILROAD GAZETTE:

I send you prints of sections of three rails taken out of track, which illustrate the two different types now under discussion, viz.: Deep heads and light bases, and shallow heads and heavy bases. The type shown by No. 6 quickly takes a permanent set in the track, the web and especially the base having generally



No. 6. { In, 1881. Out, 1889.

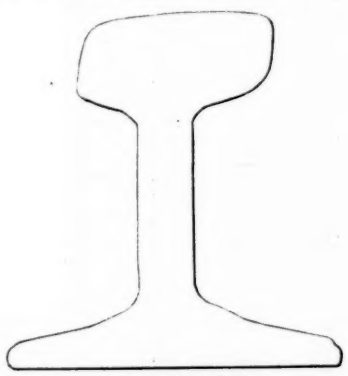
a high rate of oxidation. The type shown by No. 9 is a more elastic section, does not take a permanent set so quickly in the track, and as a rule the rate of oxidation of the base is slower, in all localities under my obser-



No. 7. { In, 1872. Out, 1889.

vation. This refers to rails $4\frac{3}{16}$ in. to $4\frac{1}{2}$ in. high. The rate of oxidation on the 5-in. rails in the track, as observed, is much slower than on the $4\frac{1}{2}$-in. rails for the same locality.

No. 6 was put in the track in 1881 and taken out in



No. 9. { In, 1869. Out, 1889.

1889. It was in the passenger tracks of the New York Central and Hudson River. No. 9 was put in in 1869 and taken out in 1889, and carried yearly a larger tonage than No. 6.

No. 7 is of the same general type as No. 9, but with a thinner web. This specimen was in the track on the Hudson River Division of the New York Central for 17 years.

P. H. DUDLEY.

Distant Switch Signals.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you let me take a hand, even at this late day, in the intermittent discussion on this subject, which has been carried on in your journal? I will first consider the matter published by you Sept. 19.

"P. S. E." gave in his letter no clue, so far as I can see, as to what *he* considers a distant signal to be for. You have over and over again stated in the plainest language the following position, as I understand it: that the distant signal is an auxiliary signal, working always in connection with a home signal, and intended solely for the purpose of indicating to trainmen in what position the home signal will be found. Its office is by implication, and, in fact, purely cautionary, and its use is to save time and secure *safety*. When inclined at about 60 degrees from the horizontal, or showing a white light at night, it tells the engine man of an approaching train; that in all human probability, the home signal, of which it is the echo, is also at safety. I have stated this at the risk of being accused of dealing in platitudes, and I think that all persons who have had much to do with interlocking and block-signaling (when I say block-signaling, I mean real block-signaling; where the home signal is at danger, stop; and not both stop and go ahead) will agree that this is the proper use and office of a distant signal.

At the beginning of this letter I made use of the term "Distant Switch Signals," but I consider this a misnomer, or, perhaps, a misconception of the conditions, for a signal is either a distant signal or not, and one of the greatest advantages of correct semaphore signaling is the fact that, no matter where a distant signal may be placed, it means the same thing that all other distant signals mean. In the case of a distant signal placed in ahead of a switch, without the intervention of a semaphore home signal, the switch target must be construed as being itself the home signal.

I do not defend this use of the distant signal on any ground except that it is a convenient and inexpensive makeshift, for, from a purely technical standpoint (and that is almost always the best standpoint) the home signal should be placed in advance of the danger it is intended to indicate. But it is manifestly better that an engineman in approaching a switch should have some knowledge of what he may expect some 1,200 ft. ahead of him than no knowledge at all. This latter is now the rule; and there seems to be no more feasible way at hand of conveying this knowledge than to provide a distant signal, interlocked with the lever, which throws the switch, the interlocking, of course, being intended to prevent the possibility of giving a wrong signal. This can and has been done in a cheap and efficacious manner.

As the matter stands now, an engineman is expected to guide himself in the management of his train by the position of the switch targets which he must pass. It would be ridiculous to insist that the engineman can do it, for he is required to make the time of his train, and he frequently cannot see the target until he gets within 200 or 300 feet of it; on the other hand, the target may be apparently right and the switch not entirely thrown; and in going through yards the lights may be so thickly placed as to be absolutely useless for guidance, except at a very slow speed.

As to the question of how fast a train should be running when it passes a distant signal, it has, so far as the office of a distant signal is concerned, "nothing to do with the case." I do not know of any two men who agree exactly as what the term "under control" really means. I have always understood its meaning as varying with the circumstances under which it is used. If used in connection with a distant signal, I suppose that it would mean that trains must not be running so fast as not to be able to stop at the home signal, if the distant signal were found at caution. However, I can see no reason for using the term in that connection at all.

I am quite unable to see that a distant signal used in connection with a switch can be made to fill in any way the provisions of a block signal. This I say in reference to your remark when you discuss the reason for the abandonment of the red square end blade as a distant switch signal: that the positive (home) form might have served a useful purpose by protecting the rear end of a train pulling into a side track. This immediately brings up the question of block signaling, which is somewhat foreign to my subject, and may, I think, be quickly dismissed. Permit me to state, however, a rule which I believe to be a fundamental and absolutely necessary part of any sufficient block system: that a home signal found at danger must be obeyed absolutely and without exception. Any other use of a home signal, in its danger position, than as a stop signal, is an abuse and will surely lead to trouble of a very serious kind. If any one doubts this, let him look over the list of rear collisions, as printed in your columns once a month, which occur on those roads where a permissive block system (?) is in use. If the switch signal were used sometimes as an indication of the position of the switch, and trainmen were led to approach the switch carefully, expecting to find it wrong, when the signal indicated danger, the signal must then be construed as a cautionary signal, and should have the form of a distant signal. Now, if in addition, it were made use of on other occasions to protect the rear of a train, it must then be undoubtedly regarded as a positive signal; but it cannot be both; and any attempt to make it both will go a long way toward discrediting it in the eyes of trainmen.

LUKE FORWARD.

Notes by the Way.

Mr. L. M. Butler, Superintendent of Motive Power of the New York, Providence & Boston, has adopted a standard smoke stack which he uses on all his engines, irrespective of size of cylinder. This stack is parallel, $14\frac{1}{2}$ in. internal diameter and 54 in. in height, above the saddle, which is bell-mouthed, the larger diameter being about 18 in. He has abandoned the use of single nozzles for exhaust pipes, and for 18-in. × 24-in. engines gets good results with openings $3\frac{3}{8}$ ins. diameter.

He has adopted 60 in. as a standard length for smoke

boxes, and engines that have had the length reduced to this limit have proved better steamers in consequence. By making these changes, Mr. Butler has accomplished a considerable saving in coal consumption.

Mr. Butler speaks very highly of the Ludlam elliptic spring, which he uses in passenger equipment and in tender trucks. This spring is met with on many other New England railroads, where it has also earned a good reputation.

Tools in Passenger Coaches.—There seems to be a difference of opinion as to the proper location inside a coach for the tools intended for use in the event of a wreck. As the ends of coaches where these tools are generally to be found are more liable to destruction than any other part of the car body, it would appear that those companies locating the tools in the centre of the coach are acting more wisely than those which place them at the ends.

Another objection to the tools being where they are generally found is that, in the case of stove heated cars, the wooden handles shrink with the constant heat they are subjected to in winter and become loose, and in consequence are unreliable at the critical moment. The writer has seen, inside the glazed case where the tools were kept, the handle of an axe so shrunken as to have dropped, apparently from its own weight, nearly half an inch from its original position, which was clearly defined at the end of the red paint with which the handle was colored.

If one place in a car is better for the location of these tools than any other, it is surely the part of master car builders to see that they are kept there. C. B.

Inertia and Velocities of Railroad Trains at Different Speeds.

The tables and diagrams given on this and the facing pages were prepared particularly to facilitate the determination of the resistance to starting trains in suburban and elevated railroad service. We are indebted to Mr. F. W. Sargent, Engineer of Tests of the Chicago, Burlington & Quincy, and his assistant, Mr. C. H. Quereau, for much of the work of calculating the quantities. The accuracy of the figures given has been checked by two independent calculations, and further, by plotting each individual result, to get the curves on the diagrams.

The tabulated information will save much trouble in calculating the following data with reference to railroad trains:

(*a*) Square of the speed in miles per hour or feet per second.

(*b*) Velocity in feet per minute equal to any speed in miles per hour from 1 to 100 miles.

(*c*) Velocity in feet per second equal to any speed in miles per hour from 1 to 100 miles.

(*d*) Acceleration, or gain in velocity, in feet per second, during one second, which if continued will give any required speed at one mile from the starting point.

(*e*) Resistance to acceleration in terms of pounds per ton of total load, or pounds per pound of total load for a given increase of speed at the end of a mile.

(*f*) Grade in per cent., or in feet per mile, which would give a resistance equal to the inertia of the train, as in (*e*).

(*g*) Weight in tons on drivers of a locomotive necessary to accelerate one ton of total train load to a given speed at the end of a mile, assuming the maximum adhesion.

In making calculations for the comparison of the power of locomotives to start trains and to compare the work done under different conditions of increase of speed, it is tedious to work out these results from the fundamental principles of mechanics, and there is constant liability to errors of computation. It is for these reasons that we have prepared the tables and diagrams.

It often occurs that a problem has the acceleration given in miles per hour at the end of a given number of feet. In such cases it will be necessary, before using the table, to find what the speed in miles per hour would be at the end of a mile if the acceleration were continued. This is a very essential point, and should not be forgotten in using the tables. The acceleration at the end of a mile is determined from the following principle of mechanics: The ratio of the squares of velocities acquired at a uniform rate of acceleration is proportional to the distances traveled.

From this, to determine the velocity acquired at the end of a mile, it is necessary to square the given acquired velocity, divide by the given distance and multiply by 5,280. The result is the square of the velocity attained at the end of a mile at the same rate of acceleration. The squares and square roots of the velocities may be determined from the tables and diagrams given. For instance, if a given train attains a velocity of five miles per hour at the end of 528 ft., the square of the velocity attained at the end of a mile would be equal to $\frac{5^2 \times 5{,}280}{528} = 250$. The square root of this is 15.8 miles per hour. Having got the acquired velocity at the end of a mile, the other data with reference to the resistance of a given train may be obtained direct from the table or diagrams.

To find the time required to run the first mile it is only necessary to divide the number of feet in a mile by the average velocity during the mile. That is, divide 5,280 by one-half the velocity in feet per second at the end of the mile.

These tables and diagrams are especially convenient in estimating the power of locomotives for suburban service and elevated roads, also in making out time tables and determining the most advisable grades at stations. Thus, if it be desired to accelerate a train of 100 tons to a speed of 40 miles per hour at the end of a mile, the resistance due to the inertia, either in pounds per pound of total load, or pounds per ton of total load, can readily be found from the diagrams or tables. By referring to the diagram of velocities in feet per second it will be found that a speed of 40 miles per hour corresponds to a velocity of 58.7 feet per second. This is the velocity which must be gained in a mile of movement of the train. Referring to the diagram of acceleration or gain in velocity per second, it will be seen that a velocity of 58.7 ft. per second at the end of a mile requires an acceleration of .326 ft. per second, and the resistance due to this gain in velocity is 20.4 lbs. per ton of load. Add to this whatever may be deemed a satisfactory figure for the friction of train, say 5 lbs. per ton, after the wheels have revolved a few times, the total would be 25.4 lbs. per ton as the resistance of the train while acquiring a speed of 40 miles per hour at the end of a mile. The gross resistance of the train then would be 2,540 lbs. The grade corresponding to the resistance of the inertia is seen from the diagram to be 1.02 per cent., or about 53.6 ft. per mile. The tons of weight on the drivers necessary to furnish friction to accelerate one ton to a speed of 40 miles per hour at the end of a mile is seen from the diagram to be .034. For 100 tons the weight would be 3.4 on the drivers on a basis of an adhesion to the rail of 600 lbs. per ton on drivers. To this should be added, of course, the weight necessary to overcome the friction of the train, which has been assumed at 5 lbs. per ton in this particular case. In the table, opposite 5 lbs. per ton, will be found .008 tons as the necessary weight on drivers to overcome the resistance of one ton when that ton demands 5 lbs. pull to move it. Hence, $100 \times .008 = .8$ tons to overcome friction. There is a total then of $3.4 + .8 = 4.2$ tons required to accelerate a total train load of 100 tons to a speed of 40 miles per hour at the end of a mile. If there be an up grade where the train is started, then the resistance due to the grade, in pounds per ton, should be added to the above.

If the adhesion were assumed less than 600, then the necessary weight on drivers would be correspondingly increased. For instance, if the friction were assumed only 300 lbs. per ton, the weight on drivers would then need to be twice as great, or 8.4 tons.

The mechanical principles and formulæ from which these data were calculated are as follows:

S = Speed in miles per hour to be acquired at the end of a mile.

$\frac{S}{2}$ = Average speed in miles per hour during the first mile run.

V = Velocity in feet per second at the end of a mile; then

$\frac{V}{2}$ = Average velocity in feet per second during the first mile run.

$\frac{5280}{\frac{V}{2}}$ = Time in seconds required to run first mile = $\frac{10560}{V}$.

$\frac{V}{10560}$ = Constant gain in velocity or acceleration in feet per second necessary to the acquirement of a velocity V at the end of a mile = $\frac{V^2}{10560} = .0000947\,V^2$

g = Acceleration due to the force of gravity, *i. e.*, 32.2 ft. per second.

Table of acceleration or gain in velocity per second for various speeds in miles per hour gained or reached at one mile from starting point. The acceleration is given in feet per second. Also of the inertia or pull on the drawbar resulting from acceleration of railroad trains; grades in per cent. and feet per mile, the resistances of which are equal to the inertias resulting from acceleration, and the necessary weight on locomotive drivers to accelerate one ton at the rates given.

Velocity in feet per second = V.	Acceleration or gain in velocity in feet per second corresponding to a speed of S miles per hour attained at the end of a mile = $.0000947\,V^2$.	Inertia or pull in lbs. on drawbar per lb. of total weight of train due to acceleration, also grade in per cent., the resistance of which is equivalent to the inertia resulting from acceleration = $.00000294\,V^2$.	Grade in feet per mile, the resistance of which is equal to the inertia resulting from acceleration = $.01553\,V^2$.	Inertia or pull in lbs. on drawbar per ton of total weight of train due to acceleration = $.00588\,V^2$.	Weight in tons on drivers of a locomotive necessary to accelerate one ton of total train load = $.0000098\,V^2$.
1	.000095	.0000029	.0150	.00588	.0000098
2	.000379	.0000118	.0621	.00235	.0000393
3	.000852	.0000265	.140	.0530	.0000885
4	.00151	.0000472	.249	.0943	.000157
5	.00237	.0000737	.389	.147	.000246
6	.00341	.000106	.560	.212	.000354
7	.00464	.000144	.763	.289	.00048
8	.00606	.000189	.996	.377	.00060
9	.00767	.000239	1.261	.478	.00080
10	.00947	.000295	1.557	.590	.00098
11	0.146	.000357	1.884	.714	.00119
12	.01363	.000425	2.242	.849	.00141
13	.01600	.00498	2.531	.997	.00166
14	.01856	.000578	3.052	1.156	.00193
15	.02130	.000663	3.503	1.326	.00221
16	.02424	.000755	3.986	1.50	.00252
17	.02736	.000852	4.500	1.70	.00284
18	.03068	.000955	5.045	1.91	.00318
19	.03418	.00106	5.621	2.13	.00355
20	.03788	.00118	6.212	2.36	.00393
21	.04176	.00130	6.867	2.60	.0043
22	.04583	.00143	7.536	2.85	.0048
23	.05090	.00156	8.237	3.12	.0052
24	.05455	.00170	8.969	3.40	.0057
25	.05919	.00184	9.732	3.69	.0061
26	.06402	.00199	10.52	3.99	.0066
27	.06904	.00215	11.35	4.30	.0072
28	.07424	.00231	12.21	4.62	.0077
29	.07964	.00248	13.09	4.96	.0083
30	.08523	.00265	14.01	5.31	.0088
31	.0910	.00283	14.96	5.67	.0094
32	.0970	.00302	15.9	6.04	.010
33	.1031	.00321	16.9	6.42	.011
34	.1095	.00341	18.	6.82	.011
35	.1160	.00361	19.1	7.22	.012
36	.1227	.00382	20.2	7.64	.013
37	.1296	.00404	21.3	8.07	.013
38	.1367	.00426	22.5	8.52	.014
39	.1440	.00448	23.7	8.98	.015
40	.1515	.00472	24 9	9.44	.016
41	.1592	.00496	26.2	9.9	.016
42	.1670	.00520	27.5	10.4	.017
43	.1751	.00545	28.8	10.9	.018
44	.1833	.00571	30.1	11 4	.019
45	.1918	.00597	31.5	11.9	.020
46	.2004	.00624	32.9	12.5	.021
47	.2 92	.00651	34.4	13.	.022
48	.2182	.00679	35.9	13.6	.023
49	.2274	.00708	37.4	14.2	.024
50	.2367	.00737	38.9	14.7	.024
51	.2463	.00767	40.	15.3	.025
52	.2561	.00797	42.	15.9	.026
53	.2660	.00828	43.	16.6	.028
54	.2761	.00860	45.	17.2	.029
55	.2865	.00892	47.	17.8	.030
56	.2970	.00925	48.	18.5	.031
57	.3077	.00958	50.	19.2	.032
58	.3186	.00992	52.	19.8	.033
59	.3296	.01026	54.	20.5	.034
60	.3409	.01061	56.	21.2	.035
61	.3524	.01097	57.	21.9	.036
62	.3640	.0113	59.	22.7	.038
63	.3759	.0117	61.	23.4	.039
64	.3879	.0121	63.	24.1	.040
65	.4001	.0124	65.	24.9	.041
66	.4125	.0128	67.	25.7	.043
67	.4251	.0132	69.	26.5	.044
68	.4379	.0136	71.	27.3	.045
69	.4509	.0140	74.	28.1	.047
70	.4640	.0144	76.	28.9	.048
71	.4774	.0149	78.	29.7	.049
72	.4909	.0153	80.	30.6	.051
73	.5046	.0157	82.	31.4	.052
74	.5186	.0161	85.	32.3	.054
75	.5327	.0166	87.	33.2	.055
76	.5470	.0170	89.	34.1	.056
77	.5616	.0175	92.	35.	.058
78	.5761	.0179	94.	35.9	.060
79	.5910	.0184	97.	36.8	.061
80	.6061	.0189	99.	37.7	.063
81	.6213	.0193	102.	38.7	.064
82	.6368	.0198	104.	39.6	.066
83	.6524	.0203	107.	40.6	.068
84	.6682	.0208	109.	41.6	.069
85	.6842	.0213	112.	42.6	.071
86	.7004	.0218	115.	43.6	.073
87	.7168	.0223	117.	44.6	.074
88	.7 33	.0228	120.	45.7	.076
89	.7501	.0233	123.	46.7	.078
90	.7671	.0239	126.	47.8	.080
91	.7842	.0244	128.	48.8	.081
92	.8015	.0250	131.	49.9	.083
93	.8191	.0255	134.	51.	.085
94	.8368	.0260	137.	52.1	.087
95	.8547	.0266	140.	53.2	.089
96	.8727	.0272	143.	54.3	.090
97	.8910	.0277	146.	55 5	.092
98	.9095	.0283	149.	56.6	.094
99	.9281	.0289	152.	57.8	.096
100	.9470	.0295	155.	59.	.098

Table of velocities in feet per minute and feet per second for speeds from 1 to 100 miles per hour.

Speed in miles per hour = S.	Square of the speed in miles per hour = S^2.	Velocity in feet per minute = $88S$.	Velocities in feet per second = $V = 1.466S$.	Speed in miles per hour = S.	Square of the speed in miles per hour = S^2.	Velocity in feet per minute = $88S$.	Velocities in feet per second = $V = 1.466S$.
1	1	88	1.466	51	2601	4488	74.766
2	4	176	2.933	52	2704	4576	76.232
3	9	264	4.399	53	2809	4664	77.698
4	16	352	5 866	54	2916	4752	79.164
5	25	440	7.333	55	3056	4840	80.630
6	36	528	8 799	56	3136	4928	82.096
7	49	616	10.266	57	3249	5016	83.562
8	64	704	11.732	58	3364	5104	85 028
9	81	792	13.199	59	3481	5192	86 494
10	100	880	14.666	60	3600	5280	87.960
11	121	968	16.133	61	3721	5368	89 426
12	144	1056	17.599	62	3844	5456	90.892
13	169	1144	19.066	63	3969	5544	92.358
14	196	1232	20.533	64	4096	5632	93.824
15	225	1320	21.999	65	4225	5720	95 290
16	256	1408	23.466	66	4356	5808	96.756
17	289	1496	24.932	67	4489	5896	98.222
18	324	1584	26.399	68	4624	5984	99.688
19	361	1672	27.866	69	4761	6072	101.154
20	400	1760	29.332	70	4900	6160	102 620
21	441	1848	30.798	71	5 41	6248	104.086
22	484	1936	32.265	72	5184	6336	105.552
23	529	2024	33.731	73	5329	6424	107.018
24	576	2112	35.198	74	5476	6512	108.484
25	625	2200	36.665	75	5625	6600	109.950
26	676	2288	38.131	76	5776	6688	111.416
27	729	2376	39.598	77	5929	6776	112.882
28	784	2464	41.064	78	6084	6864	114.348
29	841	2552	42.531	79	6241	6952	115.814
30	900	2640	43.998	80	6400	7040	117.280
31	961	2728	45 464	81	6561	7128	118.746
32	1024	2816	46.931	82	6724	7216	120.212
33	1089	2904	48.397	83	6889	7304	121.678
34	1156	2992	49.864	84	7056	7392	123.144
35	1225	3080	51.331	85	7225	7480	124.610
36	1296	3168	52.797	86	7396	7568	126.076
37	1369	3256	54.264	87	7569	7656	127.542
38	1444	3344	55.730	88	7744	7744	129.008
39	1521	3432	57.197	89	7921	7832	130.474
40	1600	3520	58.664	90	8100	7920	131.940
41	1681	3608	60.130	91	8281	8008	133.406
42	1764	3696	61.597	92	8464	8096	134 872
43	1849	3784	63.063	93	8649	8184	136.338
44	1936	3872	64.530	94	8836	8272	137.804
45	2025	3960	65.957	95	9025	8360	139.270
46	2116	4048	67.463	96	9213	8448	140.736
47	2209	4136	68.930	97	9409	8536	142.202
48	2304	4224	70.396	98	9604	8624	143 668
49	2401	4312	71.863	99	9801	8712	145.134
50	2500	4400	73.330	100	10000	8800	146.600

Diagram showing Velocities in feet per minute, feet per second and the square of these Velocities, for speeds from 1 to 100 miles per hour.

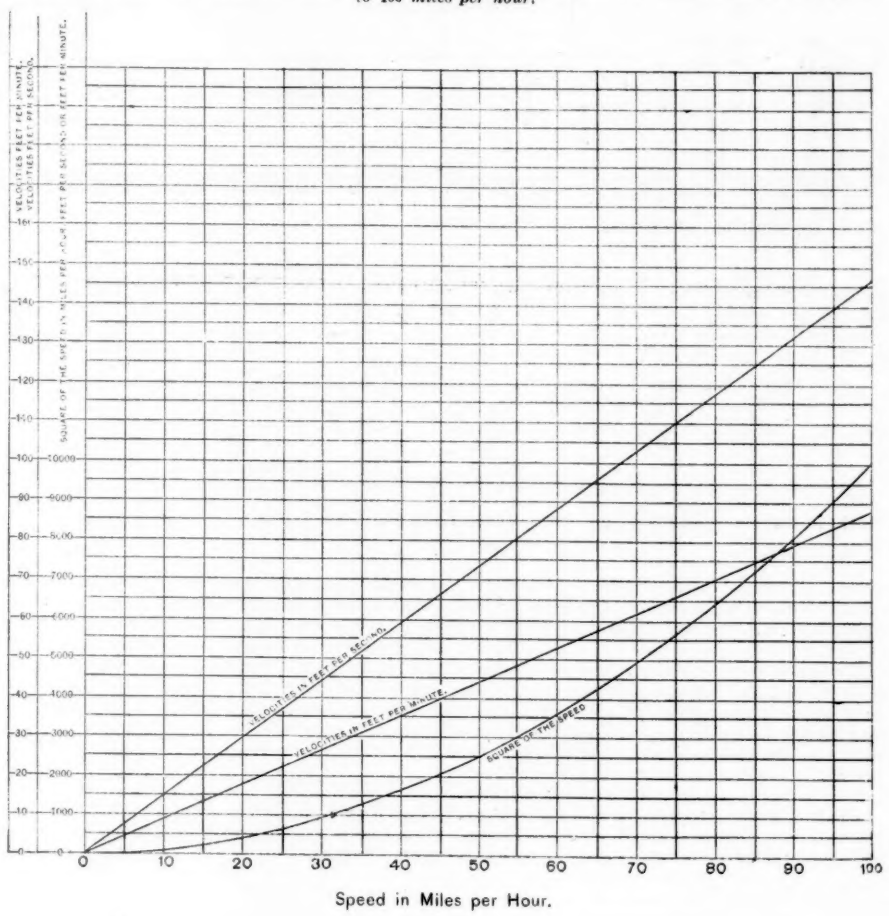
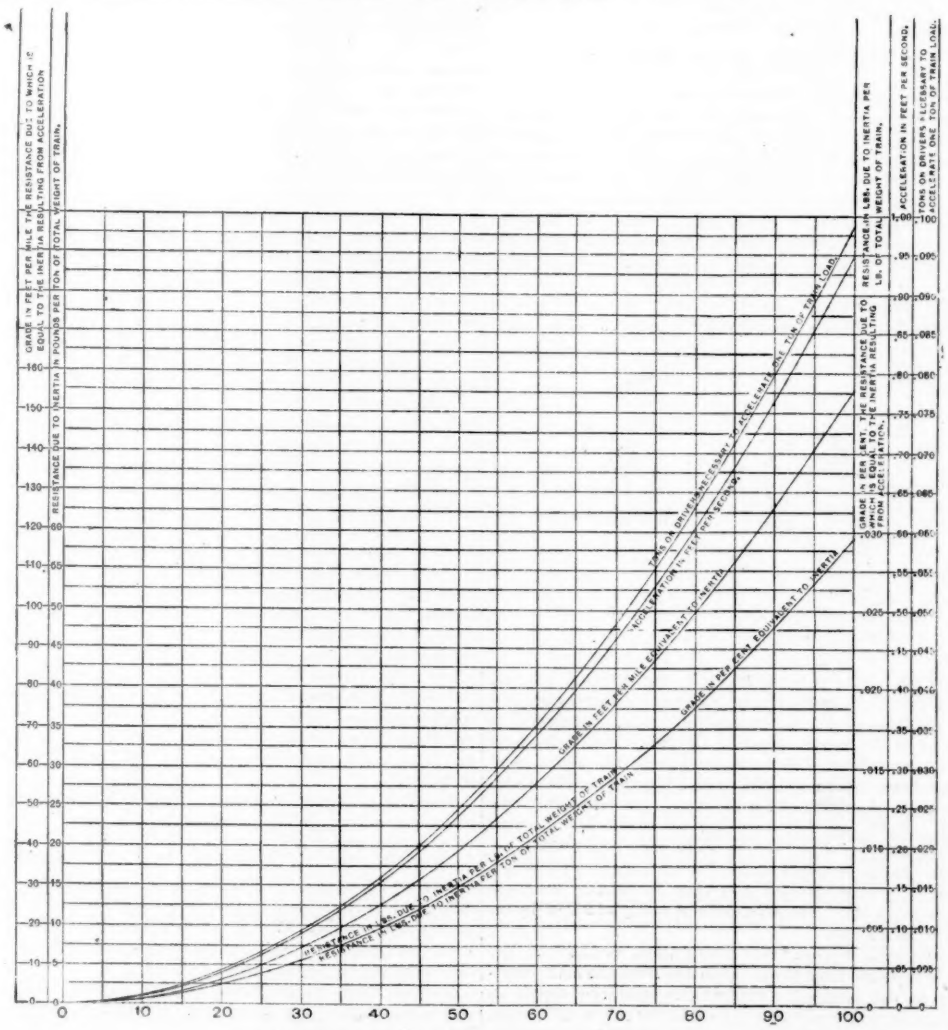

VELOCITIES FEET PER MINUTE.
VELOCITIES FEET PER SECOND.
SQUARE OF THE SPEED IN MILES PER HOUR = FEET PER SECOND OR FEET PER MINUTE.
VELOCITIES IN FEET PER SECOND.
VELOCITIES IN FEET PER MINUTE.
SQUARE OF THE SPEED
0 10 20 30 40 50 60 70 80 90 100
Speed in Miles per Hour.

Diagram of Acceleration or Gain in Velocity per second for various speeds in miles per hour gained or reached at the end of one mile from starting point; also of the Inertia or Pull on the Drawbar resulting from the acceleration of railroad trains; grades in per cent. and feet per mile, the resistances of which equal the inertia resulting from acceleration and the necessary weight on drivers of a locomotive to accelerate one ton to the speeds given.


GRADE IN FEET PER MILE THE RESISTANCE DUE TO WHICH IS EQUAL TO THE INERTIA RESULTING FROM ACCELERATION
RESISTANCE DUE TO INERTIA IN POUNDS PER TON OF TOTAL WEIGHT OF TRAIN.
RESISTANCE IN LBS. DUE TO INERTIA PER LB. OF TOTAL WEIGHT OF TRAIN.
GRADE IN PER CENT. THE RESISTANCE DUE TO WHICH IS EQUAL TO THE INERTIA RESULTING FROM ACCELERATION.
ACCELERATION IN FEET PER SECOND.
TONS ON DRIVERS NECESSARY TO ACCELERATE ONE TON OF TRAIN LOAD.
TONS ON DRIVERS NECESSARY TO ACCELERATE ONE TON OF TRAIN LOAD.
RESISTANCE IN LBS. DUE TO INERTIA PER LB. OF TOTAL WEIGHT OF TRAIN.
GRADE IN FEET PER MILE EQUIVALENT TO INERTIA
GRADE IN PER CENT. EQUIVALENT TO INERTIA
RESISTANCE IN LBS. DUE TO INERTIA PER LB. OF TOTAL WEIGHT OF TRAIN.
RESISTANCE AFTER CUT OFF TO INERTIA FEET ON OF TOTAL WEIGHT OF TRAIN
0 10 20 30 40 50 60 70 80 90 100
Velocity in Feet per Second at the End of a Mile.

The forces required to accelerate a given mass in a given time to different velocities are in proportion to those velocities. The weight of a body is the measure of the force which accelerates it in the case of gravity, and as we are considering 1 lb., or the unit of weight, as the mass to be accelerated, we have $g : \frac{V^2}{10560} :: 1$ is to the force required to accelerate 1 lb. to the velocity V at the end of a mile run, or, what is the same, to accelerate it at the rate of $\frac{V^2}{10560}$ ft. per second.

From this the pull on the drawbar—it is the same as the force just mentioned, and is properly termed the inertia—in pounds per pound of train weight is

$$\frac{V^2}{10560 \times 32.2}$$

which equals .00000294 V^2; this is the formula given in the table.

This last formula also gives the grade in per cent. which will give a resistance equal to the inertia due to acceleration.

The grade in feet per mile is .00000294 $V^2 \times 5280 =$ .01553 V^2.

The resistance offered in pounds per ton is clearly seen to be 2,000 times as much as per pound, hence it is .00588 V^2.

When the adhesion of locomotive drivers is 600 lbs. per ton of weight thereon—this is about the maximum—then the tons on drivers necessary to overcome the inertia of each ton of total train load are

$$\frac{.00588}{600} V^2 = .0000098 V^2.$$

Of course, it will be observed that in the determination of resistances no account has been taken of the rotative energy of the wheels. This is an element which varies with the weight and design of the wheels and the comparative weight of the car and, therefore, could not be tabulated with the elements considered here. It will be treated in another article.

The Railroad Situation in Western Oregon and Washington.

The railroads of the Northwest, having made rapid advance over the treeless country east of the Cascade Range in Oregon and Washington, were stopped in their quick development by the apparently difficult nature not only of the Cascade Range itself, but of the apparently rougher and heavily-timbered region lying between the Cascade Range and the coast. The main lines for the Northern Pacific road, the Southern Pacific from California, and some local roads in the more open valley bottoms were the exceptions. The chief objects of the main lines seem to be to reach tide water at the nearest possible point and get rid of their freight on board vessel without going into the question of the best shipping point as closely as is done on the Eastern coast.

Since the opening of the lines to Portland and Tacoma, as above, there has been a very general move of the railroads westward across the wooded country to the coast. It has been found that the apparent roughness of this country is largely *above ground*, and due to the heavy timber. There is little either in slopes or gradients that would be considered of importance when the timber is removed.

The removal of the Columbia River bar is probably the chief reason for this westward move. At date of September, 1889, there was a channel width of more than three miles having a depth of not less than 22 ft. at mean low water, and a width of nearly ¾ mile having a depth of 24 ft. at mean low water, all a straight channel. High water increases these depths over 7 ft. Since September, 1889, a general increase of about 2 ft. in depth has been found. With the present appropriation of $500,000 it is expected that 28 ft. at mean low water will be secured, or perhaps the 30 ft. which was predicted by Col. Corthell as the result of the present plan of jetties. The immense discharge of the Columbia River is in one channel, tending to maintain whatever depths are secured. Within 100 ft. of the outer edge of the 24-ft. channel is a small submarine precipice, a depth of from 55 to 75 ft. being suddenly found, insuring the channel against reformation of the bar further out.

These results have caused a tendency of the various railroad lines to the mouth of the Columbia. Some are planning to reach the north shore, others the south shore. The north shore would be chiefly a point of delivery of through freights. The south shore will have the local business of the large Willamette Valley and the coal and timber of the Nehalem country, as well as through freight, and will be the shipping point from Western Oregon to California. Somewhere on this south shore will be a city of some importance, and the question with some of the railroads is whether to attempt simply a terminal for their own business on the north shore or to seek a land entrance into this city, and secure its eastward and southeastward business.

TRAVELLER.

Fire Boxes and Boilers.

At the October meeting of the Northwest Railroad Club the construction of fire boxes and boilers was discussed. Mr. W. H. Lewis (C., B. & N.) read a paper. He confined his remarks to the life and cause of failure of furnace side sheets. He said that in the discussion of the proper thickness of furnace side sheets consideration has been confined to strength, ductility and thermal resistance. Mr. Lewis considers that a much more vital question is that of the inequality in the expansion of the inner and outer surfaces of the sheets. The rapid and frequent expansion and contraction separate the particles

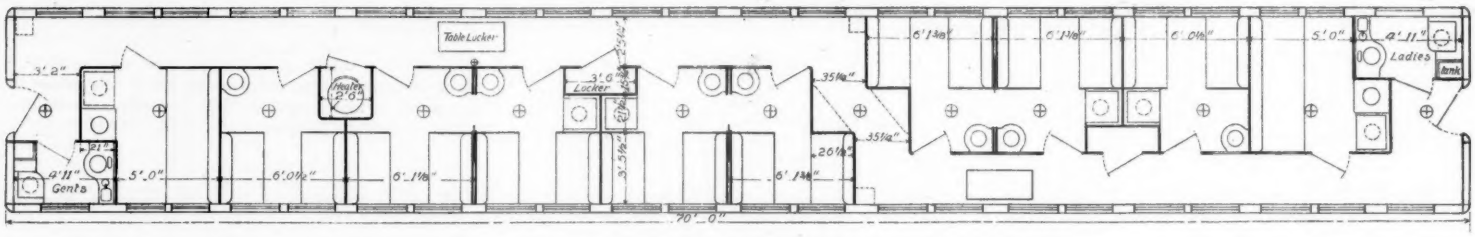


Fig. 1—WAGNER STATEROOM SLEEPING CAR "LORRAINE."

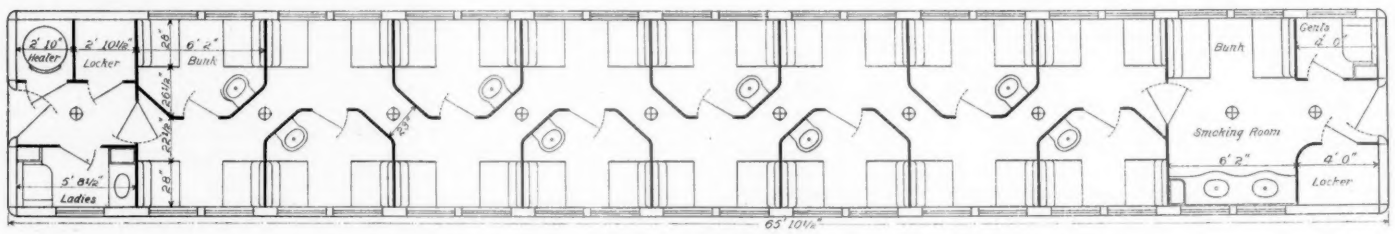


Fig. 2—WAGNER SINGLE-BERTH SLEEPING CAR—BOSTON AND NEW YORK SHORE LINE.

of the metal, and is first noticeable in the spider-web cracks which appear on the surface and gradually extend and result in fracture. The temperature of the steam and water heats one side of the sheet at, say, about 358 degrees, while the temperature of the furnace gases rises at frequent intervals to from 2,500 to 3,000 degrees. Consequently the two surfaces expand and contract unequally in amount. These facts point to the advisability of using as light sheets as possible consistent with safety, and Mr. Lewis thinks they should not exceed $\frac{5}{16}$ in. in thickness.

In lieu of corrugated sheets Mr. Lewis has for some 18 months tried offsetting the side sheets about 1 in., near the connection of the flue sheets and back sheets, practically increasing the water space that amount. These offsets somewhat relieve the tensile strain and improve the circulation.

Mr. J. L. Warren (C., St. P., M. & O.) also read a paper describing the various materials and practice used in fire-box construction.

Wagner Compartment Cars.

The accompanying illustrations, fig. 1 and fig. 2, are floor plans of two patterns of sleeping cars built by the Wagner Palace Car Company, each of which is different from the ordinary style. Fig. 1 shows one of four cars which have been running for some time on the New York & Chicago Limited. These cars are not different in their general arrangement from some built several years ago, the chief feature being, like that of the Mann cars, the means taken to secure privacy for the occupants of each section. Fig. 2 shows one of two cars recently put on the Shore Line between New York and Boston. This is a decidedly novel pattern, and was devised by Mr. E. G. Allen, late Superintendent of the Shore Line Division of the New York, New Haven & Hartford, and now on the New York Central. Its peculiarities are clearly shown by the drawing and the description printed below.

The "Lorraine," fig. 1, is vestibuled and has twelve 36-in. paper wheels. It weighs about 45 tons. The inside woodwork is of polished mahogany, profusely paneled and relieved by many beveled mirrors. The compartment at the extreme left of the cut is the smoking room, and that at the opposite end of the car is a "ladies room.'" It will be noticed that three of the partitions between staterooms have doors, permitting the adjoining rooms to be thrown together. Two rooms are finished in English antique oak, and the others of different varieties, the embossed plush on the seats and brocatelle tapestry on the walls and panels having been specially chosen as regards color to blend with the various wood finishings.

The first room adjoining the smoking room is of oak with tan plush seats, with tapestry of blue and gold, and curtains of tan and gold. No. 2 is finished in satinwood with maroon plush seats, with tapestry of salmon and gold, and curtains of pink and green. No. 3 is finished in mahogany with blue plush seats, with tapestry of blue and gold and curtains to match. No. 4 is finished in Circassian walnut with moss-green seats, with tapestry of gold, pink and green, and green and old gold curtains. Then follow rooms 5 and 6, finished in antique oak and mahogany, respectively, with tapesty and curtains of the same style as the other rooms finished in these woods. The four rooms on the ladies' side are finished in oak, Circassian walnut, mahogany and satinwood, and are decorated like the others. Each room contains a lower and upper berth, an individual hopper and nickeline wash basin, the latter affording hot and cold water, an electric button, and four gas jets for Pintsch gas. In the main gangway is a library of well-selected books, and a buffet with space for an ice-cooler. The Martin system of steam heating is used. The gas fixtures are Persian brass of elaborate pattern. The names of the four cars are: Lorraine, Magenta, Barcelona and Normandy.

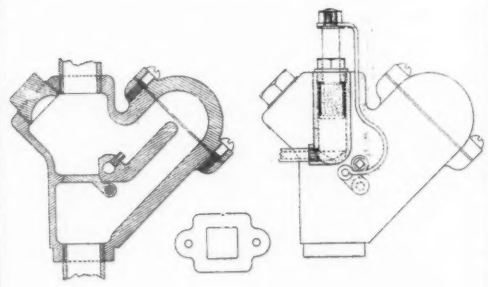
The Shore Line cars have "half-vestibules," the same as those used on two of the day trains of that line. It will be seen that there are in each car 8 state rooms and 8 curtained sections. The state rooms are fitted with two sleeping berths each, an upper and a lower, and each berth will hold but one person. The sections have but one berth, and this for one occupant only. Each car will, therefore, accommodate 24 passengers. Each state room is fitted with a lavatory and hot and cold running water. The trucks have 30-in. steel wheels. The New York Safety system of steam heating is used in connection with the Baker heater, and the cars are supplied with hot and cold water, and lighted with Pintsch gas. The lavatories are supplied with automatic house closets. The head lining is of three-ply veneer covered with canvas, and has richly carved relief ornamentations, in soft steel gray and gold tints The plush used in the upholstery is a blue fringe. The draperies are of silk, lined with damask, and the trimmings are of Persian brass. The decoration is of the Roman renaissance, or eighteenth century style.

The approximate cost of each of the six cars mentioned was $15,000.

Leach's Sand Feeding Apparatus.

In Europe considerable attention is being devoted to a proper sanding apparatus for locomotives, a matter which has not been sufficiently looked after here. However, about half a dozen patents have been taken out for devices of this sort. One of the latest was granted to Mr. H. L. Leach, Jr., of 237 Franklin street, Boston, Mass. The patent is dated Aug. 5, 1890. Mr. Leach is a well-known locomotive man, and was for a long time connected with the Hinkley Locomotive Works at Boston.

The following is a description of the device: It is designed to feed a small quantity of sand with regularity upon the rails in front of the driving wheels. Its object is to supply only that small quantity of sand which is necessary to prevent slipping, provided it is placed at the proper point on the rail. The device is in fact a trap into which the sand from the usual sand boxes runs. From this the sand is blown over the dividing wall by means of an air nozzle placed within the trap. There are two openings at the top, either of which may be used for the sand pipe, as required. A chilled cap is fastened on the front to prevent excessive wear of the sand blast, and may be readily removed when worn out. The air nozzle is easily reached by removing this cap.



The nozzle is ⅛-in. brass plug drilled, as shown. The air is supplied from the pipe leading from the main reservoir to the engineer's brake valve, and the supply is regulated by a feed valve placed in the cab within reach of the engineer. In order to prevent moisture draining from the air pipes into the trap, it is placed above the running board, and the air pipes all lead upward. The lowest points of the air pipes are placed close to the boiler or jacket to prevent freezing in case water should collect there.

The dividing wall in the interior of the trap is provided with a hinged cover, the natural position of which is open. When it is open sand passes direct from the sand box to the rails in the usual manner. This hinged cover is connected to the piston of a small cylinder cast into the trap and is closed by admitting compressed air into it through a ¼-in. pipe connected with a ¼-in. plug cock located in the cab. In this way the blast apparatus in no way interferes with the profuse sanding of rails to assist the brakes in making an emergency stop.

Railroad Matters in India.

Less than a year ago many of those most interested in the exchange question were of opinion that the price of silver would continue to fall, and that by the end of this year the rupee, nominally worth two shillings, would be quoted at one shilling and threepence. Thanks, however, to the American silver bill, it has gone up with a bound, and is now worth one shilling and sevenpence half-penny, with every prospect of reaching one shilling and ninepence before the year closes. This has so unsettled the market for produce, etc., that there is actually nothing doing, and all our railroads have large quantities of rolling stock lying idle. Traders are afraid to speculate until things settle down and the future value of our current coin is more assured. Unless there is an improvement soon many of our best railroads will not pay full dividends, and they will have to try and reduce expenses still further. Already native labor is superseding European in posts which have always been looked upon as beyond the powers of our Aryan brethren, who are not only apathetic and ignorant but are also proverbially careless. This is a proof that the cry of "India for the Indians" is affecting the railroad service to a serious extent, and we can only hope that it will not be pushed to such a degree that it will some day prove to be "India for the Russians."

The passenger traffic is steadily increasing in all parts of the country. During the year 1888-89 the number carried was 103,156,013, the fares being 64,350,321 rupees; but during the next year, 1889-90, this was increased to 110,402,383 passengers, and 68,986,147 rupees was received. All the principal railroads are improving their rolling stock. Lavatories and W. C. compartments are being fitted to third-class carriages, and, according to the new railway act, every passenger train must have one third-class carriage, fitted with these conveniences, for the exclusive use of native females after Jan. 1, 1891.

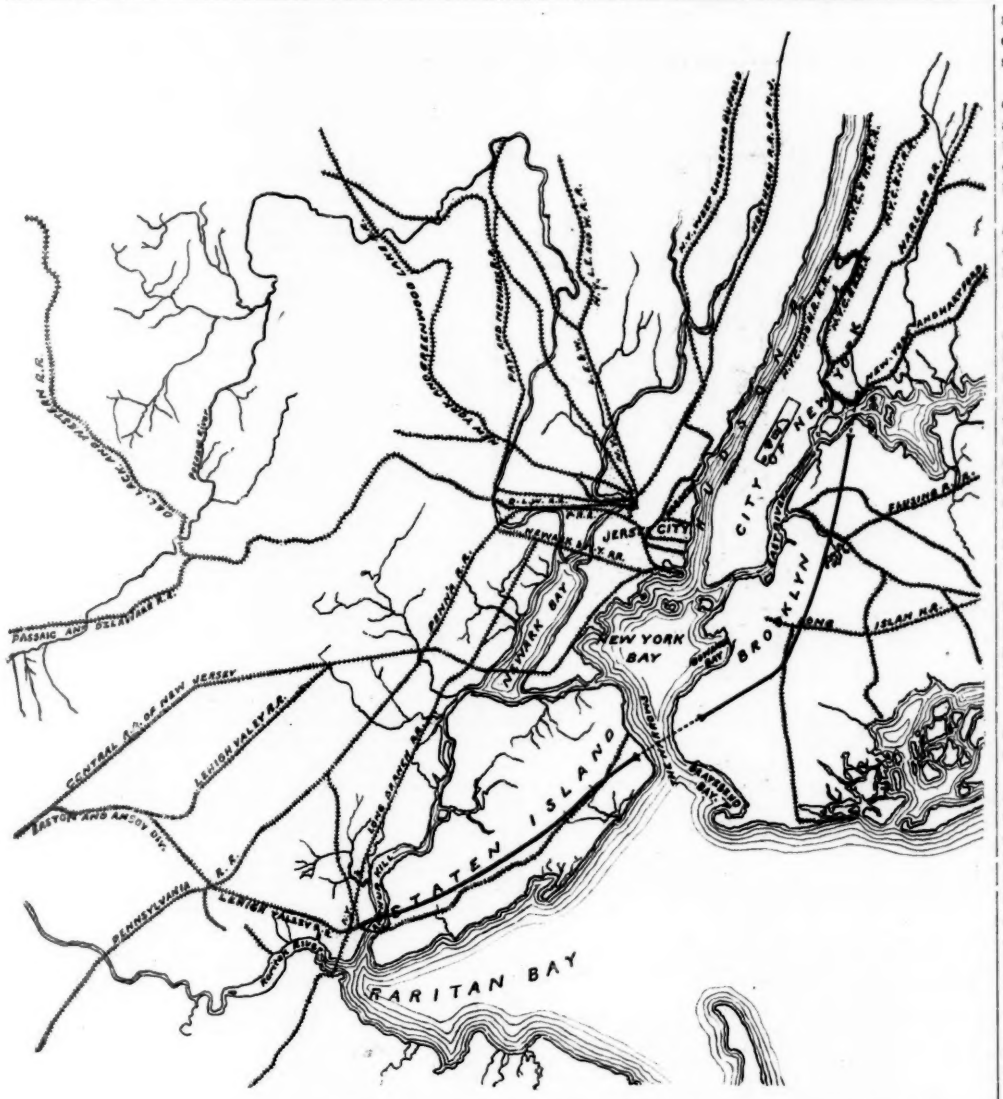
Work on the Nilghiri Mountain railroad will be commenced directly the rains are over. It will be of 2 ft. gauge, with a rack rail in the centre, and the distance from Metapolliam to Coonoor, which is 23 miles by the Ghat road, will thus be reduced to 12 miles.

The railroad from Simla to Kaika hangs fire, although the government has offered a subsidy of 150,000 rupees for 10 years, and 100,000 rupees for a further term of 10 years; and this should be sufficient to guarantee against any loss if the line is properly and economically constructed.

The Darjeeling Himalayan railroad, 2-ft. gauge, has had a succession of mishaps since the rainy season commenced; and this is scarcely to be wondered at when we learn that 86 in. of rain fell, in the region, between the 1st and 26th of July. In one place the whole side of a large hill slipped and traffic was totally stopped for nearly a fortnight. This was a serious matter, and the people of Darjeeling were in fear of a famine, owing to the stoppage of supplies from Bengal.

Our only other mountain railroad has escaped disaster so far, but 64 gaps and slips in the cart road are reported between the railroad terminus and Naini Lal. This has stopped all traffic, and flour and other necessaries are selling at famine prices.

The rains this year have been unusually heavy and many railroads have suffered considerably, and there have been serious interruptions of traffic on the principal lines. The Bolan Railway has been so seriously damaged by floods that the government will probably


NEW YORK BAY
STATEN ISLAND
RARITAN BAY
JERSEY CITY
BROOKLYN
CITY OF NEW YORK
NEWARK BAY
PASSAIC AND DELAWARE R.R.
CENTRAL R.R. OF NEW JERSEY
LEHIGH VALLEY R.R.
EASTON AND AMBOY DIV.
PENNSYLVANIA
LEHIGH VALLEY R.R.
NORTH RIVER
ERIE R.R.
NEW YORK, LAKE ERIE AND WESTERN R.R.
DELAWARE, LACKAWANNA AND WESTERN R.R.
NEW YORK, ONTARIO AND WESTERN R.R.
NEW YORK CENTRAL AND HUDSON RIVER R.R.
HARLEM R.R.
NEW YORK AND HARLEM R.R.
NEW YORK AND NEW ENGLAND R.R.
NEW YORK, NEW HAVEN AND HARTFORD R.R.
NEW YORK AND LONG BRANCH R.R.
PENNSYLVANIA R.R.
NEW JERSEY SOUTHERN R.R.
CAMDEN AND ATLANTIC R.R.
WEST SHORE R.R.
NEW YORK, SUSQUEHANNA AND WESTERN R.R.
ERIE R.R.
NEW YORK, LAKE ERIE AND WESTERN R.R.
DELAWARE, LACKAWANNA AND WESTERN R.R.
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NEW YORK AND HARLEM R.R.
NEW YORK AND NEW ENGLAND R.R.
NEW YORK, NEW HAVEN AND HARTFORD R.R.
NEW YORK AND LONG BRANCH R.R.
PENNSYLVANIA R.R.
NEW JERSEY SOUTHERN R.R.
CAMDEN AND ATLANTIC R.R.
WEST SHORE R.R.
NEW YORK, SUSQUEHANNA AND WESTERN R.R.

A SUGGESTION FOR AN ALL-RAIL CONNECTION FROM NEW JERSEY TO NEW ENGLAND.

The heavy line shows the proposed route across Staten Island and Long Island.

abandon it altogether. The maintenance of this line is very costly on account of its being laid in a valley subject to high floods, and a better route will, it is thought, be chosen in preference to the Bolan line, although the cost will be heavy.

It is not only railroads that have suffered from the heavy rains. At Bombey several houses have collapsed, and accidents of a similar nature are reported from Simla, Allahabad and Calcutta. Everywhere the country is inundated, and immense damage has been done to the crops, especially to indigo and Indian corn. The town of Ballia, in the Northwest Provinces, was badly inundated by the Ganges last year, and protective works were commenced. They do not, however, appear to be of any avail, and the river has made such a set against the left bank that by the end of the rainy season a portion of the civil station and most of the native part of the city will have disappeared.

During the last ten years several experiments in training rivers have been made, principally with the object of lessening the size of bridges required, by bringing the water within a certain well-defined channel, instead of allowing it to flow all over the country. The government of Bengal are about to take some such steps with the Damuda, which is one of the most erratic of Indian streams. For some years past it has been continually and flooding from 300 to 400 miles of country, until it has changing its course, sweeping away village after village, even left the original outlet through which it formerly emptied itself into the Hooghly. It will be a big job, but it is worth a trial, for the country damaged by the floods is valuable.

Many of the principal railroads intend accelerating the speed of their mail trains from Oct. 15. The time now allowed between Bombay and Madras will be reduced by five hours. A new service from Calcutta to Kalka in 36 hours, over the E. I. and Delhi-Kalka railroads, will be the fastest regular running yet done in India. The mail bags will be picked up by cranes similar to those in use on American railroads.

The failure of carriage and wagon axles on the B. B. & C. I. and Rajputana railroads has commanded so much attention during the last three years that the matter was taken up by the Consulting Engineer, Sir A. M. Rendel, and it has now been decided to replace all of the steel axles now in use by others made of the best iron. Sir A. M. Rendel originally recommended the use of steel, both on account of its price and because he thought it more suitable than iron; but he has now changed his opinion, and many others will no doubt follow his example.

Feeder lines are now commanding a good deal of attention, and most of the trunk railroads have several projects in hand. Some are also being taken up by native capitalists, who see the advantages to be derived from cheap and regular carriage of goods. Wood for fuel is becoming scarce on the Madras Railway, and coal cannot be supplied locally. Patent fuel is being extensively used, and the demand for Bengal coal is increasing.

The East Coast Railway is to be built on the broad gauge (5 ft. 6 in.) by State Railway engineers. Mr. Walker, late of the Assam Behar Railway, is to be the Engineer-in-Chief, and the work will be commenced in October.

Metal ties are again coming into use, owing to the fall in price. While the high prices which prevailed during the early part of this year were maintained, none of our railroad engineers would have anything to say to them, and large contracts were made for wooden ties. Very little has been done toward manufacturing metal ties locally, although we have abundance of raw material, and native labor is cheap and plentiful. The suppliers of trough-shaped, steel ties estimate their life at 50 years, but people who are better qualified to judge say 20 years is the outside allowance, as the metal oxidizes very quickly, especially in brackish soil or in damp situations.

NUT LOCK.

CALCUTTA, Aug. 10, 1890.

A Railroad Approach to New York City.

In 1876, while looking over a map of New York City and its vicinity, it occurred to the writer of this article that Long Island and Staten Island were favorably situated to afford a very superior route for railroads to approach New York from the south and west. A further study of the subject satisfied him that it might at the same time be made a connecting link between railroads coming in from the former points and those coming in from the east and north.

The plan was to cross the Arthur Kill at some convenient point, by a bridge from New Jersey to Staten Island, thence on Staten Island to the Narrows, thence by a tunnel under the Narrows and Bay Ridge to Long Island, thence through or around Brooklyn to the vicinity of Lawrence's Point, and thence by a tunnel under the East River to Westchester, where it could form a junction with the various railroads coming in from the east and north. The full line on the sketch map shows such a route.

From all that the writer could learn of the character of bottom of the Narrows, it did not appear to be such as to present very serious obstacles to driving a tunnel through it, and he believed that a tunnel might be so constructed as to be permanent. He gave this part of the problem considerable study.

A glance at the accompanying map will be an assistance in understanding the advantages of such a route, of which the following is a general description. It is not at all intended for an exact location:

1. The great facility it would afford in reaching New York. The city of Brooklyn is now well supplied with a system of elevated railroads, terminating at various important points on the East River. Two or three substantial bridges could be built across this river for what one would cost across the North River from Jersey City or Hoboken, and these bridges would have the decided advantage of distributing the traffic over a proportionately greater number of convenient points in New York City, while the railroads from the north and east would continue to enter the city by their present routes. By these means a very material assistance would be given to the solution of the rapid transit problem in New York.

2. It would place Long Island and Staten Island on a through line of railroad; a very important consideration, when it is remembered that the large and rapidly growing city of Brooklyn is completely isolated from the mainland. These islands would also have their value as suburbs greatly enhanced.

Branch tracks extending along the shores of the Bay and the Brooklyn shore of the East River would be of decided benefit as terminal facilities.

3. The advantages that such a railroad would afford in receiving and shipping goods might soon cause the erection of large storage warehouses around the outskirts of Brooklyn, where heavy goods could be received and repacked for shipment directly by rail instead of bringing them to New York and carting them about the streets by horse power, thus saving a large percentage in the cost of handling and preventing the present crowded condition of the streets from becoming much worse.

Finally. No more direct route connecting New England with the South, West, and the coal regions can be found than by the line above described.

A bridge has already been built across the Arthur Kill and a railroad on Staten Island. These are not shown on the map. A movement is now on foot to tunnel the Narrows and extend the railroad on to Long Island. That the improvement will end there is not at all probable.

L. L. BUCK.

Seamless Piping from Hollow Ingots.

A quite important advance in the manufacture of seamless piping and tubing has been introduced by the Kellogg Seamless Tube & Manufacturing Company, of Findlay, O. An inspection of the process shows first the hollow cast ingot heated and put through the blooming, which reduces the metal to less than one-half its original thickness. The blooms are then heated and passed through the machine, turning out a completed pipe or tube. The work of the machine and process are as follows: After heating, the bloom is slipped over a special mandrel designed for the purpose. It is then forced through or between a first pair of rolls, which compress it to a reduced elliptical shape, a second pair of rolls compress the bloom to a circular shape of reduced diameter, a third pair again compress the metal to an elliptical shape, a fourth pair to a circular form, and so on alternately until the last two pairs of rolls of a run of nine or ten develop the finished tube with but one heating. By changing the rolls different sizes of tubes may be made from the machine. The speed of revolution of the rolls from the first to the last vary in proportion to the reduction of diameter and the amount of metal to be shaped and passed through, so that there is no possibility of buckling, due to the pushing of the leading rolls. To hold the metal to proper shape on the inside, the mandrel extends the whole length of the machine and is located to pass centrally between the various sets of rolls. At each pair of rolls it is re-enforced to a diameter or oval suitable to the metal reduction. The diameters of the rolls and the distances between centres are made changeable to suit the required size or diameter of pipe or tubing to be made.

By this process pipes and tubes of all sizes may be made, according to the size of machine and bloom used, from 3 to 7 in. in diameter, from 8 to 16 in. and of increasing diameters, even to those of ordinary boiler shells as large as 48 to 50 in. in diameter, giving to the metal any required thickness from one-eighth to three-quarters, according to necessity. It is claimed that these machines can turn out piping or tubing at a much less cost than the lap-welding process.

Mandrel Rolled Hollow Stay Bolts.

The process of making these hollow stay bolts is as follows: Two pieces of iron rolled in U-shaped section are laid together and wired in that position. These parts are then heated to a welding heat and run through rolls. As the welded tube comes from the rolls it passes over a mandrel, which fills the interior. Before reaching the second pair of rolls it cools slightly and shrinks upon the mandrel. In the second pair of rolls it is drawn from the mandrel and the interior cleared from slag and cinder. In this way, by five repeated operations, a hollow stay bolt is obtained which has a uniform interior diameter. The material is Tennessee bloom charcoal iron, and is made in lengths of about 6 ft.

The advantages of hollow stay bolts are well understood. A considerable saving in expense can be made by using hollow stay-bolt iron instead of drilling the ends of the bolts after they are in position. However, it is necessary that the very best material be used for all kinds of stay bolts, and it is claimed by the manufacturers of this bolt that they do get the best material because of using a superior quality of iron and an improved process. These bolts are made by the Falls Hollow Stay Bolt Co., Cuyahoga Falls, O.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

STANDARD TRESTLE, CHARLESTON, CINCINNATI & CHICAGO RAILRWAY.

In the *Railroad Gazette* of Oct. 10 the general plans for the construction of single-deck trestles on the Charleston, Cincinnati & Chicago Railroad were given. The Chief Engineer of this road, Mr. A. N. Molesworth, has since informed us that while this plan was used on the older portion of the line when first built, it has been superseded by the style of construction shown in the figures accompanying this article.

The plans for single deck trestles are shown in fig. 1. In the floor system the guard rails, which are of 6-in. × 8-in. × 16-ft. material, are notched 1 in. on the ties. They are also fastened to the ties by a ¾-in. × 15-in. bolt through every third tie. These bolts pass through the spiked ties, which will be spoken of later on. The guard rail pieces are joined together at the ends by a halved joint, through which passes a single bolt.

The ties are 7-in. × 8-in. × 10-ft. and are spaced rather widely apart. They are notched 1 in. over the stringers, and every third tie is spiked to the outside pieces of each stringer by a ½-in. × 10-in. boat spike.

Each stringer is composed of three pieces, two 7-in. × 16-in. × 30-ft. pieces and one 7-in. × 16-in. × 15-ft. piece. The 30-ft. pieces break joints. The 15-ft. stick is placed between the longer ones. The various pieces are separated 2 in. from each other by cast iron separators of the form shown in the detail drawing. To each stringer joint there are four packing bolts, ¾ in. × 28 in., arranged as shown. The stringers rest directly upon the caps, to which they are spiked by six ¾-in. sq. × 24-in. drift bolts.

The caps are 12 in. × 12 in. × 12 ft., and are notched ½ in. on the under side to receive the posts, to which they are fastened by ¾-in. sq. × 24-in. drift bolts, one drift bolt to each post. The plumb posts are spaced 5 ft., and the batter posts 9 ft. from centre to centre, thus leaving 12 in. in the clear from the outside faces of the batter posts to the end of the cap. The inclination of the batter posts is 3 in. to 1 ft. All of the posts are of 12-in. × 12-in. material.

The sills, which are of 12-in. × 12-in. timber, are notched ½ in. to receive the ends of the posts which are held in place by two ¾-in. × 8-in. dowels each.

When the bents are under 12 ft. in height no bracing is used. Diagonal longitudinal bracing is introduced as shown on the plans at the ends of trestles, where the bents are partially in embankment. Intermediate sills are introduced when the height of the bent exceeds 20 ft., as in fig. 2.

For foundations piles are used in preference to sub-sills whenever they can be driven six feet or more. When sub-sills are used they are notched 1 in. to receive the sills.

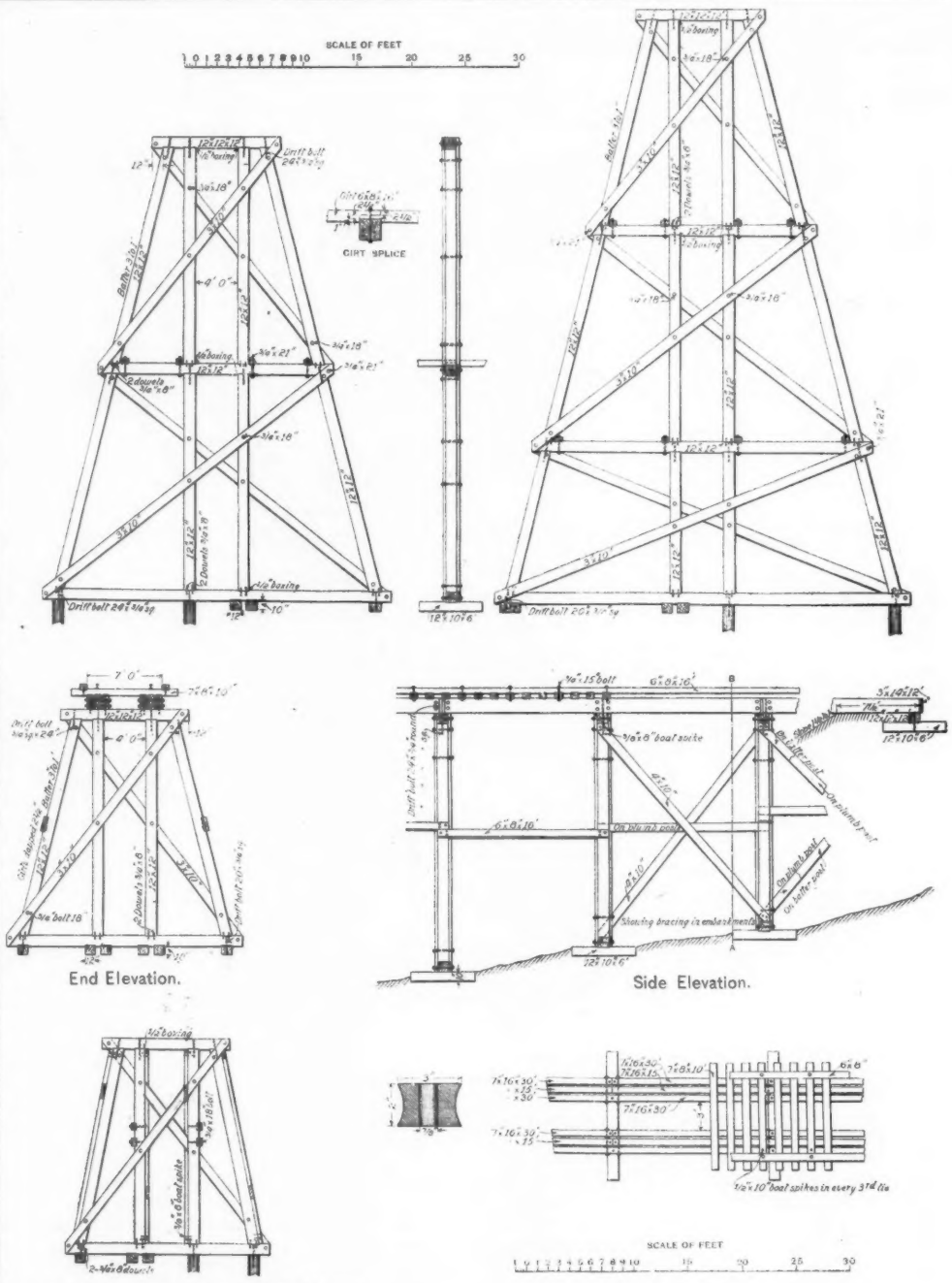
Following is a bill of timber and a bill of iron for these trestles:

BILL OF TIMBER—ONE BENT AND ONE BAY.

Name.	No. of pieces.	Size.
Floor System.		
Guard rails	2	6 in. × 8 in. × 16 ft.
Ties	10	7 in. × 8 in. × 10 ft.
Stringers	4	7 in. × 16 in. × 30 ft.
	2	7 in. × 16 in. × 15 ft.
Bent.		
Cap	1	12 in. × 12 in. × 12 ft.
Posts, plumb	2	12 in. × 12 in. × — ft.
Posts, batter	2	12 in. × 12 in. × — ft.
Sill	1	12 in. × 12 in. × — ft.
Bracing.		
Sway	2	3 in. × 10 in. × — ft.
Girts	2	6 in. × 8 in. × 16 ft.
Miscellaneous.		
Diagonal longitudinal bracing	..	4 in. × 10 in. × — ft.
Sub-sills (laid flat)	6	12 in. × 10 in. × 6 ft.
Piles	4	.....
Ballast plank	..	3 in. × 14 in. × 12 ft.
Bank sills	..	12 in. × 12 in. × 12 ft.
Intermediate caps	..	12 in. × 12 in.

BILL OF IRON.

Name.	No.	Size.	Use.
Bolts	8	¾ in. × 15 in.	Guard rails to ties.
	12	¾ in. × 18 in.	Sway braces to posts.
(Packing)	8	¾ in. × 28 in.	Stringer joints.
Drift bolts.	2	¾ in. sq. × 20 in.	Sills to subsills.
	10	¾ in. sq. × 24 in.	Stringers to caps. Caps to posts.
Dowels	8	¾ in. × 8 in.	Posts to sills.
Spikes (boat)	12	¾ in. × 8 in.	Girts to posts.
	8	½ in. × 10 in.	Ties to stringers.
Separators.	8	2 in. × 3 in.	Between stringer pieces.
Washers	..	3 in. (cast).	Under heads and nuts of bolts.



STANDARD TRESTLE—CHARLESTON, CINCINNATI & CHICAGO RAILWAY.

Train Accidents in September.

COLLISIONS.

REAR.

1st, on Chicago & Northwestern, at Chicago, Ill., a passenger train ran into the rear end of a freight on a curve, disabling engine and wrecking caboose and 3 cars.

1st, on Pittsburgh & Western, at Highland, Pa., a freight train ran into the rear of another freight, wrecking several cars and injuring 2 trainmen.

2d, on Louisville, New Albany & Chicago, at Greencastle, Ind., a freight train ran into the rear of another freight, wrecking engine, caboose and several cars.

3d, on New York, Lake Erie & Western, at Susquehanna, Pa., a passenger train ran into a locomotive standing on the main track, damaging both engines.

3d, on New York, Lake Erie & Western, at Stevens Point, Pa., a freight train ran into the rear of a preceding freight, wrecking several cars.

4th, on Baltimore & Ohio, near Farmington, W. Va., a freight train ran into the rear of a preceding freight, wrecking 16 cars, which caught fire and were totally consumed. Two trainmen killed and another injured.

4th, on Cincinnati Southern, at Harriman, Tenn., a freight train ran over a misplaced switch and into some empty passenger cars standing on a siding, damaging a number of them and disabling the engine.

4th, on Iowa Central, near Peoria, Ill., a freight train ran into the rear of a preceding freight on a bridge, damaging the latter and wrecking caboose and 3 cars. Fireman injured.

4th, on Baltimore & Ohio, near Mannington, W. Va., a freight train ran into the rear of another freight, badly wrecking engine and 16 cars. The wreck took fire and was burned up. Engineer and a man riding on the locomotive were killed.

4th, night, on Western New York and Pennsylvania, at Olean, N. Y., an excursion train struck a misplaced switch and ran into some freight cars, badly damaging the locomotive, several coaches and a number of freight cars. Engineer and several passengers injured.

5th, on Gulf, Colorado & Santa Fe, at Alvin, Tex., a freight train ran into the rear of another freight which had stopped at a water tank, doing slight damage.

5th, 5 a. m., on Denver & Rio Grande, near Florence, Col., a first section of a freight train which had come to a stop unexpectedly on a curve was run into by a closely following section, badly wrecking several passenger cars filled with laborers, of whom 5 were killed and 33 injured.

7th, on East Tennessee, Virginia & Georgia, near Johnson City, Tenn., a freight train ran into the rear of another freight, wrecking engine, caboose and several cars, and killing a drover. It is said that a drunken engineer was the cause of the mishap.

7th, on New York, Lake Erie & Western, at Hoopers, N. Y., a freight train ran into the rear of another freight, wrecking caboose and 4 cars.

8th, on Pennsylvania Co.'s road, at Edenburg, Pa., a freight train ran into the rear of a preceding freight, wrecking locomotive and 10 cars.

9th, on New York and New England, at Worcester, Mass., a passenger train ran into some freight cars which had been left standing on the main track, disabling the locomotive and derailing a number of box cars.

9th, on Memphis & Charleston, at Lime Rock, Ala., freight train ran into the rear of a preceding freight, wrecking engine and caboose.

11th, on Pittsburgh, Cincinnati & St. Louis, at Selma, O., freight train ran into the rear of a preceding freight, wrecking engine and ditching 14 cars.

11th, 4 a. m., on Chesapeake & Ohio, at Russell, Ky., passenger train ran into the rear of a freight train, wrecking caboose and one car, injuring fireman and brakeman.

11th, on New York Central & Hudson River, near Schodack, N. Y., an engine and caboose which had been brought to a stop by a preceding freight were run into by a following freight and forced into the caboose of a foremost train. Two engines, 2 cabooses, and several cars damaged. The wreck caught fire and was partially burned, and a conductor was killed.

12th, on Georgia Pacific, near Brompton, Ala., a freight train ran into the rear of a preceding freight, wrecking several cars.

12th, on New York Central & Hudson River, in New York City, a string of freight cars in being let down into a siding became uncontrollable and crashed into some cars standing there, wrecking 4 of them. Brakeman injured.

14th, on Georgia Pacific, near Kramer, Ga., a freight train ran into the rear of another freight, doing slight damage.

15th, night, on the New York, New Haven & Hartford, near Berlin, Conn., freight train broke in two and the rear part afterwards ran into the forward portion, wrecking 15 cars.

15th, night, on Pennsylvania, at Linden, N. J., freight train ran into the rear of a preceding freight, wrecking engine and a dozen cars. A brakeman was slightly injured.

15th, on Boston & Maine, near West Lebanon, N. H., a freight train ran into the rear of a preceding freight, derailing and damaging engine and 3 cars.

15th, night, on Pennsylvania, near Tannery Creek, N. J., a coal train ran over a misplaced switch and into the rear of a freight train standing on a siding, badly wrecking engine, caboose and a number of cars. The fireman of the colliding train, who was sent forward to see if the preceding freight was out of the way and to flag his train upon its approach, sat down upon the track and fell asleep and was run over and killed. A tramp stealing a ride was also killed.

15th, on Boston & Maine, near Lebanon, N. H., a freight train ran into the rear of another freight, damaging engine and 3 cars.

16th, on Louisville, New Orleans & Texas, near Vicksburg, Miss., a passenger train ran over a misplaced switch and into a box car standing on a side track. The box car mounted the engine, damaging it badly, killing engineer and fireman. It is thought that the switch had been maliciously misplaced.

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16th, on Union Pacific, near Lakeview, Utah, freight train ran into the rear of another freight, damaging engine and caboose.

17th, on Northern Pacific, at Barnes Siding, Wash., a westbound passenger ran over a misplaced switch and into the rear of a freight standing on a side track, wrecking engine, caboose and several cars. Fireman and 3 passengers injured.

18th, on Pennsylvania, near Haskins, Pa., a westbound passenger was run into at the rear by a work train, doing slight damage.

19th, on New York, Ontario & Western, at Fulton, N. Y., passenger train ran into the rear of coal train, doing slight damage.

19th, on Pennsylvania, near Lilly, Pa., a freight train broke in two and the rear portion was run into by a following freight, wrecking engine and several cars. Three trainmen injured.

19th, 6:15 p. m., on Philadelphia & Reading, near Shoemakersville, Pa., freight train ran into the rear end of a preceding freight which had been stopped by the breakage of a coupling. Several cars were derailed and thrown upon the northbound main track, where they derailed a passenger train, as reported elsewhere. The brakeman of the foremost train has been held by a corroner's jury responsible for the collision, he having been slow in going back with a danger signal.

20th, on Pennsylvania road, at Menlo Park, N. J., a freight train ran into the rear of a preceding freight, doing considerable damage. Conductor killed.

21st, on Louisville, New Albany & Chicago, at Greencastle, Ind., a freight train ran into a preceding freight, disabling engine and damaging caboose.

21st, on South Carolina road, at Summerville, S. C., passenger train ran over a misplaced switch and into a standing passenger car, doing slight damage.

21st, night, on Denver & Rio Grande, near Marshall Pass, Col., passenger train ran into the rear of a preceding freight, doing slight damage and injuring a brakeman.

21st, 8 p. m., on Chicago, Burlington & Quincy, near Hawthorne, Ill., an Illinois Central passenger train, eastbound which had stopped for a danger signal and, had just resumed its course, was run into at the rear by a C., B. & Q. passenger train, badly wrecking the rear car and damaging two others. Four passengers were killed and 8 injured. The line is straight at this point, the weather was fair, and the block system is used; the C., B. & Q. train was admitted to the section under a cautionary signal. No flagman went out from the foremost train.

21st, on New York, Lake Erie & Western, near Middletown, N. Y., a fast freight train ran into the rear of a preceding freight, wrecking engine, caboose and several cars. Conductor and a brakeman killed and another brakeman badly hurt.

22d, on New York Central & Hudson River, near Schenectady, N. Y., a freight train ran into the rear of a preceding freight which had stopped to cool a hot box. The caboose was wrecked and 6 cars were derailed and burned up.

22d, on Union Pacific, near Nampa, Idaho, a freight train broke in two and the rear portion was run into by a following passenger train, wrecking engine, baggage car and caboose and a number of freight cars. Engineer and fireman injured and a man riding in a caboose killed.

22d, evening, on Wabash road, at Forest Park, Mo., a passenger train of the St. Louis, Kansas City & Colorado road entering upon the Wabash tracks at the junction was run into, just after it had cleared the switch, by a St. Louis, Keokuk & Northwestern passenger train, approaching on the main line. The engine and 4 passenger cars were badly wrecked and the engineer and fireman killed. Sixteeen passengers were injured, 3 fatally. It is said that the Keokuk engineer ran past a fixed danger signal.

24th, on Pennsylvania, at Donahoe, Pa., freight train ran into the rear of a preceding freight, wrecking 15 cars of coke.

24th, on Kansas City, Memphis & Birmingham, near Glen Allen, Ala., freight train ran into a light engine, damaging engine and one car. A flag was sent out by the light engine but the freight engineer claims he did not see it.

24th, 4 a. m., on Kanawha & Michigan, at Sattes, W. Va., freight train ran over a misplaced switch and struck two engines, one of which was rerailing the other on a side track, badly wrecking all three engines.

24th, on Louisville & Nashville, at Edgefield Junction, Tenn., freight train ran into the rear of a preceding freight, blocking the road for several hours.

25th, on Chicago, Rock Island & Pacific, at Altoona, Ia., a freight train which had stopped to do some switching was run into at the rear by another freight, disabling engine and damaging caboose and 2 cars.

27th, on Pennsylvania, near Vineyard, Pa., freight train ran into the rear of a preceding freight in a fog, wrecking 6 cars and blocking the road two hours.

27th, on Savannah, Americus & Montgomery, near Cordele, Ga., a through freight train ran into the rear of a local freight standing on the main track, damaging engine and 3 cars.

27th, on Fremont, Elkhorn & Missouri Valley, near Cody, Neb., a stock train ran into the rear of a preceding stock train, killing one passenger and injuring another. The wreck took fire and the dead body was somewhat burned.

28th, on Northern Pacific, at Tenino, Wash., a special freight train ran into the rear of a passenger train which had been delayed at this station, damaging engine and the rear sleeper. Two men stealing a ride in a lumber car were killed.

29th, on Pennsylvania, at Radnor, Pa., a freight train ascending a grade broke in two and the rear portion, consisting of 29 cars, ran back down grade and into the head of another freight, making a bad wreck. There was no one on board the runaways. The conductor had been struck by an overhead bridge and fatally injured and the rear brakeman was attending him when the train parted. A car of coal was set afire, but the fire was soon put out.

29th, on Louisville & Nashville, at Bolling, Ala., freight train ran into the rear of preceding freight, doing slight damage.

30th, on Boston & Maine, near Belmont, Mass., freight train ran into the rear of a switching freight, wrecking 15 cars.

BUTTING.

4th, on East Tennessee, Virginia & Georgia, near Floville, Ga., butting collision between freight trains, wrecking the forward portion of both.

4th, on Philadelphia, Wilmington & Baltimore, at Perryville, Md., butting collision between a freight train and a switching freight, damaging the locomotives and 2 cars. Trainman injured.

5th, on Newport News & Mississippi Valley, at Stepstone, Ky., butting collision between passenger and freight trains, damaging both engines and killing a fireman.

5th, on Delaware & Hudson Canal Co., near Howard's, N. Y., collision between northbound passenger train and southbound freight, due to misunderstanding of orders. Three trainmen killed.

6th, on Missouri Pacific, near Lexington, Mo., butting collision between a passenger train with engine at the rear and a wild engine. A coach was badly wrecked and 2 passengers killed and several injured.

7th, on New York Central & Hudson River, at Albany, N. Y., owing to a mistake in signaling, a freight train ran over a misplaced switch and into the head of another freight, damaging both engines and derailing 3 cars.

8th, on Baltimore & Ohio, near Littleton, W. Va., butting collision between two double-header freight trains, owing to a dispatcher's mistake, wrecking 4 engines and about 40 cars. Two trainmen killed and 5 injured, 3 of them perhaps fatally.

8th, on Pennsylvania Co.'s road, at Moravia, Pa., butting collision between two freight trains, wrecking both engines and a number of cars.

8th, at 4:10 a. m., on New York Central & Hudson River, in Lockport, N. Y., butting collision between 2 passenger trains, wrecking the forward portion of both. Baggageman killed and engineer and fireman injured. The trains had orders to meet at West Lockport. The westbound was reported half an hour late, and this, together with the fact that a light in a semaphore signal had gone out, led the runner of the eastbound to attempt to meet the other train at Lockport.

9th, on Florida Central & Peninsular, at Chaires, Fla., butting collision between a mixed train and a freight train, wrecking both engines and several cars, killing a conductor. The engineer of the latter ran past a meeting point, notwithstanding his fireman's admonition.

10th, on Delaware & Hudson Canal Co., at Albany, N. Y., a passenger train ran over a misplaced switch and into the head of a standing freight train, damaging both engines.

10th, on Lake Shore & Michigan Southern, near Silver Creek, N. Y., butting collision between a westbound freight train and a construction train, wrecking both engines.

10th, on Cincinnati, Lebanon & Northern, at Cincinnati, O., a switching freight became uncontrollable in descending a grade, the track being wet, and collided with a yard engine, doing considerable damage, and killing the engineer of the latter, who was underneath his engine.

10th, on Georgia Midland & Gulf, at Griffin, Ga., a car got away from a switching freight, ran out upon the main track and collided with a passenger train, doing slight damage.

11th, on Pennsylvania, near Farmingdale, Pa., butting collision between passenger trains, wrecking both locomotives. Four passengers injured.

12th, at Rockford, Ill., butting collision between Chicago, Milwaukee & St. Paul construction train and Chicago & Iowa switching freight which was emerging from a covered bridge. Five trainmen injured, four of them by jumping. The engine of the freight, having been reversed before it was abandoned, ran back across the bridge, where it was derailed.

12th, on Pennsylvania, near Fairfield, N. J., butting collision between passenger trains in a dense fog, damaging the engines.

15th, on Union Pacific, near Black Buttes, Wy., butting collision between freight trains, caused by dispatcher's mistake, wrecking both engines and 10 cars. One engineer was killed and 3 trainmen injured.

17th, on Union Pacific, near Rock Springs, Wy., collision between eastbound and westbound passenger trains, damaging both engines The trains had orders to meet at Rock Springs; the westbound was behind time, and the runner apparently forgot his orders and ran past the meeting point. He was, however, soon checked by the conductor and was setting back when the collision occurred.

18th, on Jerflersonville, Madison & Indianapolis, near Columbus, Ind., butting collision between freight trains, wrecking both engines and 12 cars. The wreck caught fire and was destroyed. Brakeman killed.

20th, on Chicago & Northwestern, near Union Centre, Wis., butting collision between freight trains, badly damaging both engines and 11 cars.

20th, on Union Pacific, near Glenn's Ferry, Idaho, butting collision between passenger trains, badly damaging both engines. One of the trains had passed the proper meeting point, and the engineer had just discovered his error and was trying to set back.

21st, on Central New England & Western, near Poughkeepsie, N. Y., butting collision between passenger and freight trains, badly damaging both engines and a number of box cars.

21st, on East Tennessee, Virginia & Georgia, near Macon, Ga., butting collision between two freights in a dense fog. Engines and 3 cars damaged.

23d, on Northern Pacific, near Tacoma, Wash., butting collision between 2 freights, doing slight damage.

24th, on Galveston, Harrisburg & San Antonio, near Schulenburg, Tex., butting collision between a freight and a work train, badly damaging both engines.

26th, on Union Pacific, near Shoshone, Id., butting collision between passenger trains, due to a misplaced switch.

26th, 4 p. m., on Baltimore & Ohio, at Midway, O., butting collision between freight trains, wrecking several cars and exploding a tank of oil, which fired the wreck, several cars being burned up. A boy in a car of household goods was burned to death. It is said that one of the conductors forgot a special order.

28th, 12.30 a. m., on Baltimore & Ohio, near Black Hand, O., butting collision between freight trains, making a very bad wreck, and killing 5 employés and 2 passengers who were on one of the trains. The operator at Black Hand failed to deliver an order which was sent to him for one of the trains. The dispatcher disobeyed a rule which required him to get another signature, besides that of the operator, before moving a train against the order which was forgotten.

28th, on Baltimore & Ohio, near Barnesville, O., butting collision between passenger trains 103 and 46, wrecking both engines and several cars One engineer and an express messenger injured. The engineer of train 103 heard that his son was killed in the collision at Black Hand, and was greatly depressed; at the next station he learned that the report was unfounded, and was then so overcome with joy that he forgot his train order.

29th, 8 p. m., on Central of New Jersey, near Mauch Chunk, Pa., butting collision between southbound passenger train No. 9 and a northbound coal train, making a very bad wreck. Three employés were killed, and 2 employés and 4 passengers injured. The passenger train was running by special orders on the northbound track on account of the obstruction of its regular track by a derailed freight. An order had been sent to Lehighton to hold northbound trains, but was not delivered to the coal train.

30th, on Boston & Maine, near Passumpsic, Vt., butting collision between a freight train and a train consisting of a live and a dead engine. The collision occurred in a covered bridge, and one car was forced through the roof of the bridge. Both engineers injured.

CROSSING AND MISCELLANEOUS.

1st, on Baltimore & Ohio, at Foys Hill, Md., a passenger train crashed into the side of a freight train moving across the main track, wrecking engine, baggage and smoking car and 5 box cars. The smoking car was broken in two, injuring a passenger. Engineer injured by jumping. It is reported that a flagman failed to signal the express.

1st, on Missouri Pacific, at Kansas City Mo., collision between a passenger train and a switching engine, disabling both locomotives and injuring an engineer.

2d, on Southern Pacific, at Houston, Tex., a yard engine collided with some freight cars, doing some damage and injuring 3 trainmen.

2d, on Erie & Pittsburgh, near New Castle, Pa., collision between a passenger train and a switching freight, wrecking both engines and a number of cars, including a combination car. One trainman injured. It is said that there was a mistake in giving instructions to a flagman.

3d, on Alabama Midland, near Ozark, Ala., collision between a passenger train and a freight crossing the main track, damaging both engines.

6th, p. m., on New York, New Haven & Hartford, at South Norwalk, Conn., a westbound passenger train ran past a red signal and into the side of a Danbury & Norwalk passenger train, which was just leaving the tracks of this company for its own road. One car was badly damaged and 7 passengers were injured.

6th, evening, on Danbury & Norwalk, near South Norwalk, Conn., the hind truck of a passenger car on the rear of a freight train was thrown by a defective or unfastened switch upon a side track, causing the car to collide with the engine of a passenger train standing there. A brakeman was badly injured.

6th, near Syracuse, N. Y., a New York Central & Hudson River freight ran into the side of a Rome, Watertown & Ogdensburg freight at a crossover, throwing 4 cars of the latter over an embankment, demolishing an adjacent dwelling.

4th, on Northern Pacific, at Spokane Falls, Wash., an extra freight train ran into a yard engine standing at a water tank. To lessen the shock of the collision the runner of the latter started the engine back and leaped from the cab. The deserted engine ran a distance of 10 miles and stopped for want of steam.

4th, at Atlanta, Ga., owing to a misplaced switch, a Georgia Pacific switching freight ran into the side of a Western & Atlantic switching freight, doing slight damage. The locomotive of the latter, the cab of which had been abandoned, broke away from its train and ran some distance out upon the main track and collided with an incoming passenger train, wrecking both engines.

4th, on Pittsburgh, Fort Wayne & Chicago, at Delphos, O., a freight train ran into the side of a construction train entering a side track, wrecking engine and 10 cars.

7th, on Black Hills & Fort Pierre, near Piedmont, S. D., collision between a wrecking train and an engine sent out to assist a wreck, badly damaging a car filled with laborers. Fifteen employés injured.

8th, on Pennsylvania Co.'s road, at Lawrence Junction, Pa., a freight train ran into the side of another freight crossing the main track in the opposite direction, doing considerable damage.

9th, on Pennsylvania, in Camden, N. J., collision between a westbound freight train and an empty passenger train, doing some damage. Trainman injured.

11th, on Jeffersonville, Madison & Indianapolis, in Louisville, Ky., collision between a freight train and a yard engine, damaging engine and several cars. Switchman injured.

11th, on Baltimore & Ohio, near Leith, Pa., collision between two locomotives, badly damaging both.

11th, on Philadelphia & Reading, near West Manayunk, Pa., collision between fast freight train and switching engine going through a crossover, doing some damage.

12th, at the crossing near Honey Grove, Tex., collision between Texas & Pacific freight and Gulf, Colorado & Santa Fe light engine. Both locomotives disabled.

12th, on Chicago & Grand Trunk, at Schoolcraft, Mich., a passenger train ran into the rear portion of a freight entering a siding, wrecking engine and 2 cars of the former and the caboose and 6 box cars. Four trainmen injured.

13th, on Baltimore & Ohio, at Soho, Pa., a switching engine bumped against two ore cars standing on a siding, causing them to run down a grade some distance and collide with an engine, doing some damage. Fireman injured.

13th, night, on New York, Lake Erie & Western, at Ridgwood Junction, N. J., a freight train backing out of a siding was run into by another freight approaching on the main line at too high speed, making a bad wreck, which blocked the road all night.

13th, on New York Central & Hudson River, at Melrose, N. Y., a train consisting of an engine and one baggage car ran through a crossover and into a freight train, wrecking two freight cars and injuring 3 trainmen. The switch was set for the crossover, but it is said that the train ran past a semaphore standing at danger.

18th, on Pennsylvania, at Wilkinsburg, Pa., a local passenger train crossing the main track was run into by a freight train, damaging a baggage car.

18th, on Pennsylvania, at Bessemer, Pa., a freight train crossing the main track was run into at the side by another freight, doing slight damage.

18th, on Nashville, Chattanooga & St. Louis, at Nashville, Tenn., the rear car of a switching freight broke loose on a grade and ran down into an engine standing on a siding, badly damaging both. Engineer and fireman slightly injured.

19, on Baltimore & Ohio Southwestern, at Jackson, O., a freight train ran into a car projecting at crossing, doing some damage.

19th, at Jacksonville, Fla., collision between Florida Central & Peninsular and Jacksonville, Tampa & Key West freight trains, damaging engine, caboose and 4 cars.

21st, on Baltimore & Ohio, at Banning, Pa., a freight train ran into the rear of a preceding freight, wrecking engine and caboose. The engine of the foremost train went for assistance, and before it returned was run into by the wrecking train which it had called. The last

(*Continued on page 756.*)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Solid Bridge Floors.

Solid iron floors for railroad bridges have still but comparatively few advocates in the United States; but it is probable that those who would like to have a chance to try them are a good deal more numerous than those who advocate or use them. Engineers are getting to be more disposed to look upon this mode of construction; they are giving more weight to its advantages and attacting less importance to its disadvantages than they did a few years ago when solid floors were discussed in the United States from a theoretical standpoint only. Within the last two years we have had occasion to publish engravings of solid corrugated floors, made up of trough-shaped sections or built up of plates and angles, as designed by Mr. George S. Morison or by the engineers of the New York Central, the New York, Providence & Boston and the Pencoyd Iron Works. On the New York Central, especially, solid floors have been freely used in recent structures. All of these published examples are of quite short span, except the Willamette bridge at Portland, Ore., which has a 340-ft. draw span and a 320-ft. fixed span with corrugated floors. The Rome bridge of the New York Central is 98 ft. 5⅛ in. long. The Saundersville bridge of the New York, Providence & Boston is 94 ft. long centre to centre of end bearings.

Some of the special advantages of solid floors are illustrated in the longer spans cited above. In the Willamette bridge, for good reasons, the base of the rail was put but 30 in. above high water. By the use of the plate floor and stiff chords the depth from the base of rail to the lowest part of the bridge superstructure was reduced to a minimum, and a solid horizontal plate girder was made, to better resist shocks and strains from flood drift. The Rome bridge was another case where the limit between grade above and clear head room below was very close, and the base of the rail was put but 20 in. above the lowest line of the floor. In both cases the ties are placed in the bottoms of the troughs and the Rome bridge is ballasted. Of course, cases where the depth of floor is so restricted are comparatively rare, but when they do occur they offer good opportunities for using solid floors to advantage for either long or short spans. In fact, in certain situations solid plate floors are about the only possible expedient.

There are other advantages of plate floors which are generally recognized which are entirely independent of location or span of the bridge. The ties placed in the bottom of the troughs and well imbedded in ballast make a floor that is little liable to be broken up by derailed trucks; and, besides being safe, such a floor is noiseless. It is a matter of common observation on the New York Central that an experienced trackman on a train going over the ballasted, short-span bridges now common on that road cannot tell the bridge from a bank, either by the sound or the motion.

Another well recognized advantage of ballasted, plate floors is one that is more realized in bridges of short spans, say below 100 ft.; that is, the reduction of the shocks of impact and of vibration. Of course, it has been known for a good while that short span bridges for railroad service must have comparatively more dead load than long spans; and in modern practice engineers are carrying out this principle more and more in designing short spans, by reducing the unit stresses, and thus increasing the dimensions of all members, where they are not hampered by necessary economy of first cost. But it is still a question if it is not better to increase the weight in the floor itself in greater ratio than in the trusses. Those who have used ballasted floors most are most convinced of their great value in saving the masonry of abutments by reducing the shocks and motion transmitted. On the New York Central the breaking up of the masonry of short span bridges, under the increasing weight and speed of trains has become in late years a matter for very serious study. It has become necessary to rebuild either the masonry or the bridges, and it has generally been found cheapest to repair the old masonry, and replace the superstructure by spans with solid, ballasted floors. Similarly the superstructure itself is relieved and its life increased by the reduced vibration under the impact of the moving loads.

The advantages of plate floors which we have summarized above are pretty generally acknowledged. Some of them could be had in bridges with open floors and some could not; some of them could be secured by putting ballast on creosoted ties and some could not; but that all of them are desirable no one will deny. The only question is if they are not too dearly purchased. One objection to a great increase of the weight of the floor system is the necessary increase in the dimensions of the truss members to carry it. It must be remembered that in the modern system of dimensioning, by Weyrauch's formula, the unit stresses for dead loads are materially less than for live loads. That is, in modern practice the dimensions of the working parts do not increase directly with the dead loads. And further, the weight of the floor system is but a fraction, often but a small fraction, of the total weight of the structure. It follows that in modern practice the weight of the floor system can be increased by a large percentage, while the dimensions of the truss members are increased by only a small percentage. It is a legitimate question then if an increase of the weight of the structure, concentrated where the blows are delivered, viz., in the floor, is not more effective than the same increase distributed throughout the system. We will leave this question for the bridge men to discuss.

Further, it is objected, and this is the most common and plausible objection, that ballasted plate floors are difficult to inspect and to protect against corrosion. Those who use them, however, are of the opinion that this objection is rather theoretical than practical. They think that by proper treatment of the plates they can be effectively protected against corrosion, and that if properly treated quite infrequent inspections of the upper surface will suffice. These can be easily made by removing the ballast at intervals. The under side of the floor can be readily inspected, cleaned and painted. The 27th of last June we published the specifications of the New York Central and the New York, Providence & Boston for the treatment of the plates for their ballasted floors. On the New York Central they are immersed in a bath of asphalt and coal tar, heated to 350 deg. Fahr., and the plates must have a temperature of 300 deg. Fahr. five minutes after removal from the bath. The troughs are then covered under the ties with a gravel and asphalt concrete. The New York, Providence & Boston floors are treated in much the same way, except that the corrugations are filled and the plates are covered to a depth of 4 in. above the top of the floor with gravel and tar, and asphalt concrete. So far as we have been able to ascertain, no trouble from corrosion has been seen yet on the bridges of either of these roads. Time and experience must settle this question.

In what we have said we have not attempted to demonstrate that plate floors should be adopted for all short span bridges; much less have we attempted to fix the length of span for which they should be used. We have merely aimed to call attention again to a subject which is really important, and which has never had the attention that it should have from the engineers of America. It is not sufficient to say that ballasted floors cannot be protected from corrosion and that it is bad theory to put dead weight where it does no work. Those who use ballasted floors say they can be protected, and it may be demonstrable that economy of construction, and longevity, can be secured by concentrating a certain extra dead weight where it does none of the work of the bridge machine, but where it can most effectively absorb shocks.

A Case for the Suspension of the Block System.

"There is an exception to every rule," and the block system, which unfortunately is the exception and not the rule (where the situation ought to be just the opposite), should sometimes be suspended. It is true that the only block system is the absolute block system. Permissive blocking, so called, is really a suspension of the block signaling rules. Unfortunately, very few roads in this country feel able to enforce absolute blocking, except for a part of the time, or for a portion of the trains. It should be the aim of every superintendent to put absolute blocking in force as rapidly and as extensively as he possibly can, but actual experience with heavy traffic has demonstrated that there are rational exceptions. On the New York Central, between Spuyten Duyvil and the Grand Central station, New York City, which, by the way, is about the only piece of road of any considerable extent in this country on which the absolute system is invariably enforced, passenger trains have on a number of occasions been delayed by a blockade of the track in such a way as to cause inconvenience which really ought to be treated as unbearable. Passengers have become so exasperated that the newspapers have found texts for very forcible complaints, which at the same time are unusually free from the foolish and irrational utterances and tone so often found in that class of writing.

In the blizzard of 1888 the first stoppage of a train on account of the snow necessitated the stoppage of another at the next block in the rear; this process was repeated until each signalman for several miles was holding a train load of passengers. A few weeks ago a similar state of things ensued on account of a freight wreck near Yonkers. On Oct. 16 a derailment at Mott Haven was followed by the detention of 15 or 20 trains (one in each block section) between that point and the Grand Central Station, several of which were held in the tunnel. In the two cases last mentioned the passengers were, most of them, on their way home to their evening meal, and, after three hours' waiting, were very hungry and, of course, cross. Where a signal tower is close to a station passengers can generally get out and buy crackers or beer, and their impatience is measurably appeased. Where the train is held on the banks of the Harlem River, a mile from the nearest fourth-class restaurant, the situation is not so satisfactory; if the people find themselves on a high and narrow viaduct, where they can escape only by the dangerous expedient of walking along the track, they are still worse off: when they are in a narrow and poorly ventilated tunnel, in a dark night, they are in a very disagreeable situation even if they can walk along the ditch between the cars and the wall to the stairway, and get out to the open air; but when the train is in the middle of a two-mile tunnel, with no safe exit except at the ends, the passengers may be fairly said to be imprisoned.

The remedy for this difficulty is to suspend the absolute block system. Competent critics insist that in the cases cited the railroad company was grossly negligent in starting the trains out of the terminal station; but it should hardly be necessary to discuss this question, for, where there are two or three block stations in the tunnel, and trains follow each other at short intervals, one or two trains might be stuck there in spite of the best management: and the remedy should be as available for a single train as for a dozen.

Most railroad officials accustomed to ordinary American practice would, indeed, suspend the block system at once, and order trains thus stopped in a dungeon to follow one another out to a more suitable place for waiting; but we speak of the question thus at length, because we heartily commend the principle under which block regulations are made so as to be suspended only with difficulty, and to let it be clearly understood that we do not counsel even temporary modification of any rule made to insure safety, except for strong reasons. It is to be admitted that runners when told to follow another train within the same block and to run under control are liable to run too fast; if reports are correct, we had an example of this at Chicago last month. It is true that there will generally be no ultimate saving of time in reaching destination by huddling a number of trains together in one block, only to be separated again when

they are released; but that is not to the point. It is true, also, that relaxation of regulations at one time, by a competent officer, may lead to laxity at other times by operators and trainmen, unless the discipline is the best. But these considerations are still insufficient to warrant the detention of passengers in the irksome situations we have described, when it is *known* that the delay will be a long one. Rules for the conduct of permissive blocking are by no means perfect, either in this country or in England; and we cannot admit that it is impracticable to improve those rules, and the discipline under them, so that a cautious superintendent would feel free to run passenger trains under them on occasion; but, in the situation we are now considering, the convenience of passengers warrants sending a man on foot with signals, ahead of each train, if necessary. This course should be regarded as always open when it is possible for a man (or a party of men) to make his way along the track; to ignore such an obvious method of relief involves the idea of slavery to routine which no one thinks of applying in other affairs. Much might be written concerning the relative expediency and safety of the different ways of meeting the difficulty under consideration, but it is not necessary. Superintendents well understand the bearings of the various arguments and our aim is simply to place the case before them.

Aiding the Engineer to Keep a Good Lookout.

A correspondent on the Long Island Railroad writes in criticism of the views of "A Superintendent" on various points of signaling practice, given on the first and second pages of the *Railroad Gazette* of Sept. 5. That superintendent's opinion was, in brief, that the engineer is more intelligent and a higher class man generally than the other employés on trains, and therefore should have the sole responsibility of observing signals. The Long Island man agrees with Mr. Nichols that semaphores should never be put to danger until after the whole of a train has passed it. He also dissents from the view of the superintendent as to the responsibilities placed upon a brakeman, which it is claimed are not light but of great importance. "Long Island Man" begins by telling how a brakeman on a heavy excursion train at night felt the speed slackening at a place where it ought not to do so, and crawled over the tender and found both engineer and fireman asleep; and argues, on this and other points, that both front and rear brakemen should be instructed to watch all fixed signals. It is not right to put this responsibility on the conductor, because conductors have clerical and other duties which take their attention. Passenger conductors especially have to give a large share of their time to the collection of tickets, etc. Brakemen, as a rule, are an intelligent set of men, and therefore can well be trusted with this duty. The argument for keeping a signal at clear until the whole of a train has passed it is similar to that presented by previous correspondents, but emphasizes the point that conductors and brakemen have a right to know that the engineer of their own train has not made a mistake, and that only by the practice advocated can they have a chance to satisfy themselves on this point. Attention is called to the fact that a brakeman going back with a red signal to stop following trains is charged with fully as delicate and responsible duties as the engineer, each performing functions which if slightly neglected may result in disaster and death. If the view that the conductors and engineers are the only men to be trusted is given currency, it will tend to make brakemen indifferent and careless. These points cover the substance of "Long Island's" letter.

It is true that brakemen should be constantly taught, by precept and practice, to regard their positions as responsible ones. Passenger conductors must delegate some of their duties, in connection with the protection of the train from collision, to their subordinates. The freight conductor often finds it necessary, for the expeditious handling of the train, to be at the forward end, and in doing this he must trust the tail-end man to perform all the duties of his important office wholly on his own responsibility. A road can make no mistake in getting the best intelligence possible for this department of its work, nor in paying enough wages to keep faithful men in these places. All this may be said without disputing a word of "Superintendent's" article.

The point that conductors and brakemen desire to know whether or not their engineer has made any mistake is not without weight. While we may not require them to invariably look for signals, it is reasonable to conform the practice as far as possible to their personal wishes. A brakeman who takes no interest in this question, not caring whether the engineer rushes into danger or not, is too dull to make a good brakeman. The main reason for putting the signal to danger as soon as possible after a train has used it is to have it in that position in ample time to stop the next following train; the engineer of the latter may sight the signal at some distance and claim the right to pass under it, when in fact it may be desirable and right for the signal man to hold him, in the interest of all trains or of the general conduct of the service. Readers of the *Railroad Gazette* will recollect reports of collisions on English roads in consequence of the blunder of the engineer under circumstances of this kind.

This being the case, there would seem to be no objection to meeting the trainmen half way, and varying the time for holding a signal at clear, according to the length of the train. This principle could be consistently followed by signalmen keeping the signal at clear until the caboose reached a point where the rear brakeman could see the signal if he chose to, and then immediately throwing it to danger. As we have before stated, the proper enforcement of a rule requiring a conductor or brakeman to positively observe a signal and to check the engineer in any negligence at this point demands that the trainman be always near the head of the train, and that he be relieved of other duties to an extent sufficient to enable him to do this without fail. He must be able to detect the engineer's oversight *at once* if he is to do it effectively; and to maintain discipline he must be held to strict account for every neglect to obey the rule himself.

We fully recognize the need of a check on engineers as readers of these columns know, but the fireman is the man for this duty. He can do it promptly, and, except on the Wootten engines, where he is 20 ft. behind the engineer, can be trained so that his presence on the engine will be a valuable factor of safety. A due regard for the highest safety demands that an engineer have a monitor at other places than those marked by fixed signals, and the fireman is the only person who is always available for this purpose. The excuse often presented by and for engineers, that neglect of the lookout was inevitable, on account of the necessity of attending to the injector or other machinery, is one that we do not recognize as valid. The fireman should always be called to take up the lookout whenever the runner has to neglect it, even for the shortest time. Runners can, if they try, perform many of these little duties while still keeping their "eyes right" ahead, and the alert ones confirm this statement by their practice. What is necessary is to inculcate alertness in the whole force. All firemen should be trained to keep a lookout at a large number of designated places. Merely to look out "when not otherwise engaged" is so indefinite that it amounts to almost nothing. Every time an engine passes close by a passenger train, or near a crowd of standing passengers, or approaches a passenger station just as a passenger train on an adjoining track is leaving it, there is need of the very best lookout, and in many cases (where the track is curved) a lookout on both sides is needed; and yet one can any day see engines thus approach with the engineer looking out at the side window and the fireman breaking coal in the tender. It is true that people generally look out for themselves, and that few would be injured if the engineer and fireman should both be stricken with blindness at a place such as we have mentioned; but that is poor satisfaction to a conscientious runner when a woman or a child is run over. Theoretically, every superintendent relies more or less on the fact that there are two men on every engine who can keep a lookout; why not make this reliance actual by strengthening the grounds on which it is based?

The New English Freight Classification.

Under the Railway and Canal Traffic Act of 1888, the Board of Trade was empowered to make very considerable changes in classification and in maximum rates. An effort to reach this result by agreement with the companies proved futile, and the Board has been compelled to exercise its authority in the matter. The results themselves, and the statement of principles on which they are based, possess decided interest and importance.

The railroad companies in England have been subject to an extremely complicated system of charter maxima, beyond which charges are illegal; but the legal maximum in any particular case is often hard to determine and almost always useless as a practical means of control. The original charters were granted at a time when the nature of railroad business was imperfectly understood. There is an inextricable confusion between tolls for the use of track, motive power, or vehicles, and maximum charges for all these services combined. The schedules for different companies differed somewhat from one another and had no relation to the classification actually in use. The rates were established at a time when railroad economy was so little understood that they are now absurdly high for all except the very shortest distances and practically inoperative as a means to prevent extortion.

The actual rates charged by the companies have been arranged without much reference to the charters, on the basis of agreement with one another. The so-called "clearing-house classification" has been quite universally adopted; the "Normanton scale" has in a great many instances formed the starting point for calculation of rates. The Board of Trade wisely determined to take these, rather than the charters themselves, as the basis of its work, and thus to undertake a radical revision of rates, rather than a simple codification of existing charter maxima, which would have been at best of very little use.

Starting from the clearing-house clasification and making as few changes as possible, the Board of Trade has arranged matters as follows (beginning at the bottom instead of the top, the universal practice in English schedules):

Two mineral classes, A and B, the former including coal, sand, ore, rough stone, and waste, the latter including brick, cement, dressed stone, undamageable iron and steel, and a large variety of similar products. For each of these classes there is a four-ton minimum.

Class C (corresponding to class S of the clearing-house) including grain, flour, timber, etc., with a minimum of two tons.

Five, parcels classes, with a minimum of 336 lbs. shipment, numbered from 1 to 5, corresponding more or less roughly with the three highest classes of our Trunk Line classification, but with the numbers in reverse order. Services of collection and delivery are usually included in the rates for these numbered classes. Parcels smaller than 336 lbs. are calculated by weight at the rates of their corresponding class, but are subject to certain special charges in addition. Special classification and charges are provided for animals; also for milk, fruit, ice and other perishable goods.

Car-load rates are provided on classes A, B, C and 1; train-load rates (250 tons minimum) on classes A and B.

Commodity rates and special rates of an analogous character are extremely common, and apparently likely to continue so. The Midland Railway does 75 per cent. of its business at such special rates; the London & Northwestern, 73 per cent.; the Northeastern, 61 per cent.; the Great Eastern, 55 per cent. It should be said that these figures include all business done at other than regular class rates, and are, therefore, not so unreasonable as might at first sight appear.

The rates allowed by the Board of Trade for the several classes are calculated in a rather complicated manner. They include a service terminal, a station terminal, and a graduated mileage charge whose unit diminishes as the distance increases. We give in full, with slight rearrangements, the class maxima provided for the London & Northwestern.

(Tons of 2240 pounds.)

MAXIMUM RATES FOR CONVEYANCE.

Class.	For any distance not exceeding 20 miles.	For any distance exceeding 20 miles, but not exceeding 50 miles.	For any distance exceeding 50 miles, but not exceeding 100 miles.	For any distance exceeding 100 miles.
	per ton per mile, pence.	per ton per mile, pence.	per ton per mile, pence.	per ton per mile, pence.
A. Train loads	0.85	0.75	0.60	0.45
Car loads	0.90	0.80	0.65	0.50
Four-ton lots.	0.90	0.85	0.70	0.60
B. Train loads	1.15	1.05	0.90	0.75
Car loads.	1.20	1.10	0.95	0.80
Four-ton lots.	1.25	1.15	1.00	0.85
C. Car loads	1.65	1.55	1.35	1.05
Two-ton lots.	1.70	1.60	1.45	1.15
1. Car loads.	2.15	2.00	1.75	1.50
1. Parcels.	2.20	2.05	1.80	1.55
2. "	2.65	2.50	2.20	2.00
3. "	3.00	2.85	2.70	2.35
4. "	3.60	3.45	3.30	2.90
5. "	4.30	4.05	3.75	3.40

MAXIMUM TERMINALS.

Station terminal at each end.	Service terminals.							
	Loading.		Unloading.		Covering.		Uncoveri'g.	
Per ton. s. d.	Per ton. s. d.		Per ton. s. d.		Per ton. d.		Per ton. d.	
A 0 6	..	..	..	..	..	..	..	..
B 0 9	..	..	..	..	..	..	..	..
C 1 0	0	3	0	3	1		1	
1 1 6	0	5	0	5	1.50		1.50	
2 1 6	0	6	0	6	2		2	
3 1 6	0	8	0	8	2		2	
4 1 6	1	0	1	0	3		3	
5 1 6	1	3	1	3	4		4	

A noticeable feature in this schedule is the very small difference between car loads and parcels, especially in Class 1. The conveyance rate for parcels is 2.20 pence per ton mile for short distances, and for car loads 2.15 pence; the terminal charges being the same in both cases. The difference, instead of being exaggerated, as is the tendency in America and on the Continent, is reduced to the merest trifle. Doubtless the English authorities have good reason for their practice in the particular circumstances of their traffic, and it would be presump-

tuous to criticise them at this distance; but it certainly seems as if a greater difference between parcels and car loads were warranted under almost any conditions of railroad traffic, and would make it possible to reduce the enormous number of special or commodity rates now given.

Another thing which will strike an American reader is that the rates proposed are high. The conveyance rate, exclusive of terminals, is in only one case in the table less than a cent a ton a mile; and that only for long distances. If car-load rates for grain in America were calculated on the basis allowed by the Board of Trade, the rate from Chicago to New York would be over 65 cents per hundred pounds. For short distances, in spite of the allowance for station terminals at each end, the rates are relatively very much lower, and should in many instances prove an effective check upon extortion. At the same time they are far from being anywhere near so low as a granger would desire. The average Western legislator would despise the Board of Trade for contenting itself with such slight reductions as it has made. In fact, many of the English traders feel that way. The following letter addressed to the Board of Trade in connection with the present inquiry breathes a spirit with which we are all familiar:

"BERWICK.

"What we want is to have our fish carried at *half* present rates. We don't care a —— whether it pays a railway or not. Railways ought to be made to carry for the good of the country, or they should be taken over by the government. This is what all traders want, and mean to try and get."

The Board of Trade looks upon letters of this kind with good-natured amusement rather than with dread of losing its power if it disregards them. We do not hear of Lord Salisbury's telling Sir Michael Hicks-Beach that he will jeopardize the party in power unless he yields a courteous ear to complaints of this kind. In this respect the Board has a decided advantage over certain railroad authorities elsewhere.

September Accidents.

Our record of train accidents in September, given in this number, includes 124 collisions, 120 derailments and 10 other accidents, a total of 254 accidents, in which 127 persons were killed and 338 injured.

These accidents are classified as follows:

COLLISIONS:	
Rear	56
Butting	32
Crossing and miscellaneous	36
	—124
DERAILMENTS:	
Broken rail	5
Loose or spread rail	4
Broken bridge	3
Defective switch	6
Defective frog	1
Broken wheel	2
Broken axle	7
Broken truck	5
Fallen brakebeam	1
Broken car	2
Loose cowcatcher	1
Broken drawbar	1
Misplaced switch	5
Runaway train	3
Bad loading	3
Careless running	3
Cattle on track	8
Landslide	4
Man on track	1
Malicious obstruction	6
Accidental obstruction	3
Purposely misplaced switch	3
Unexplained	45
	—120
OTHER ACCIDENTS:	
Boiler explosion	2
Lightning	1
Fire in car	1
Miscellaneous	6
	— 10
Total number of accidents	254

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two	1	..	1	2
Misplaced switch	7	2	1	10
Failure to give or observe signal.	7	1	6	14
Mistake in giving or understanding orders	..	8	..	8
Miscellaneous	8	7	7	22
Unexplained	33	14	21	68
Total	56	32	36	124

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	..	19	..	19	7
Defects of equipment	2	17	3	22	9
Negligence in operating	53	14	3	70	28
Unforeseen obstructions	1	25	4	30	12
Unexplained	68	45	..	113	44
Total	124	120	10	254	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger	53	29	5	87	23
Freight and other.	198	92	7	297	77
Total	251	121	12	384	100

The casualties may be divided as follows:

KILLED.	Collisions.	Derailments.	Other Accidents.	Total.
Employés	43	27	3	73
Passengers	13	25	3	41
Others	6	7	..	13
Total	62	59	6	127
INJURED.				
Employés	110	52	2	164
Passengers	47	122	3	172
Others	..	2	..	2
Total	157	176	5	338

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	3	35	6	12
Defects of equipment	..	..	3	4
Negligence in operating	13	48	44	112
Unforeseen obstructions and maliciousness	24	36	11	15
Unexplained	1	53	9	21
Total	41	172	73	164

Fifty-six accidents caused the death of one or more persons each, and 54 caused injury but not death, leaving 148 (50 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with September of the previous three years shows:

	1890.	1889.	1888.	1887.
Rear collisions	56	26	25	37
Butting "	32	21	21	43
Crossing and other collisions	36	14	12	3
Derailments	120	59	57	63
Other accidents	10	2	3	4
Total "	254	132	128	150
Employés killed	73	26	29	52
Others "	54	20	17	9
Employés injured	164	77	35	131
Others "	174	85	158	60
Passenger trains involved	87	51	42	66
Average per day:				
Accidents	8.47	4.40	4.20	5.00
Killed	4.23	1.53	1.10	2.03
Injured	11.26	5.40	7.40	6.37
Average per accident:				
Killed	0.500	0.348	0.360	0.407
Injured	1.330	1.227	1.742	1.237

The worst accident of the month was that at Shoemakersville, Pa., the 19th, which was discussed in the issue of Sept. 26. This accident is classed as being caused by "accidental obstruction," and the record of deaths and injuries caused by negligence, which constitutes a very large proportion in our record, will therefore have an advantage to this extent, as it is clear that negligence was the cause of this disaster. Other accidents which caused the death of passengers were those at Johnson City, Tenn., 7th; Hawthorn, Ill., 21st; Nampa, Idaho, 22d; Forest Park, Mo., 22d; Cody, Neb., 1st; Lexington, Mo., 6th; Midway, O., 26th; Eagle Grove, Wash., 2d; Jasper, Fla., 22d; North Syracuse, N. Y., 16th, and Lead City, S. D., 13th. These are named in the order in which they appear in the list.

The derailment at Glencoe, Mo., on the 13th, was a bad one, and we believe some of the casualties were fatal, but the accounts are not explicit on this point. The rear collision at Florence, Col., on the 6th, was a horrible one. But in this as in other cases of a similar character at that distance, we get no definite particulars. The butting collisions at Mauch Chunk, Pa., and Black Hand, O., were discussed Oct. 10 and 17, respectively. The malicious wrecking of the Montreal express at Castleton, N. Y., the 4th, was one of the most notable cases of the month, but, fortunately, resulted in but little personal injury. Among the curious or unusual accidents of the month were those at Radnor, 29th; Rockford, 12th; Chaires, 9th; Banning, 21st, and Atlanta, 4th.

The collision at Howards, N. Y., the 5th, was caused principally by an engineer forgetting a train order which he had in his pocket, and the New York Railroad Commissioners recommend all roads to enforce the Time Convention rule requiring enginemen to "place orders in the clip before them until executed." The cause of the collision at South Norwalk, Conn., the 6th, was discussed in the issue of Sept. 19. The butting collision at Lockport, N. Y., the 8th, was caused by the negligence of an engineer and two switch tenders. The coroner's jury which made this verdict also censures the railroad company "for employing incompetent and ignorant men." The rear collision of passenger trains at Hawthorn, Ill., the 21st, was undoubtedly the result of depending upon two agencies for protection—the fixed signals of the block system and the hand signals of the brakeman—while there was no definite line of division between the duties of the two. Another case in which a train followed another under a caution signal and ran into it was that at Middletown, N. Y., the 20th. In both these cases the engineer of the following train seems to have assumed that the preceding train, which he was ordered to look out for, would, in fact, look out for him. The old fable about the man who tried to support himself on two stools and between them fell to the ground seems not wholly inapplicable here.

The junction at Forest Park, Mo., where occurred a bad collision on the 22d, apparently is not equipped with interlocking signals, as it is stated that the train which was run into had stopped to wait for its brakeman, who had to set up the switch after his train had passed over it. It is not clear, therefore, what sort of a fixed signal the other train disregarded. The derailment at North Syracuse, N. Y., on the 16th, where a passenger on the platform of a car was killed, is classed as "unexplained," but it is worthy of note that the engine was running tender first. Several unexplained derailments under circumstances of this kind have appeared in these records within the past five years, but it is noticeable that not only do our "first-class roads" run engines (drawing passenger trains) this way, but they run them at high speed.

At Cleveland, O., on the evening of the 6th, a locomotive struck and overturned an electric street car, injuring a dozen persons. At Rome, Ga., on the 25th, a "dummy train" was badly wrecked by an engine of the Rome & Decatur road. At Davenport, Ia., on the 1st, an electric street car eluded control of the man in charge and ran down a hill into a Rock Island train, killing one and injuring several of the passengers (in the street car). The account makes no mention of any injury to the Rock Island train. A butting collision on the Mexican Railroad, Sept. 19, at Rinconada, is said to have killed 10 persons.

A recent issue of *Engineering* gives in considerable detail, with diagrams, the results of trials of the Westinghouse quick-action brake made on the Belgian State Railroads last July. Two runs were made on successive days, on a course of 30 kilometres. The train was composed of a locomotive, 16 loaded cars, 32 empty cars, 1 composite car and 1 van carrying the registering apparatus. It weighed 638 tons, the braked weight being 288 tons. The course was on descending grades, the heaviest grades being 84 ft. and 74 ft. per mile. The tests were for emergency stops, service stops, stops from burst hose, and graduation. An emergency stop from 40 miles an hour on a down grade of 84 ft. per mile was made in 293 yards. Another on a lighter grade was made from 25 miles per hour in 126 yards. A run was made of 20 kilometres without a stop, to test the graduation. On the constantly descending grades, including the heavy ones above-mentioned, the speed was kept at 28 to 34 miles an hour and the speed lines of the diagrams are very smooth. The emergency stops were made without shock. Another run of 240 miles was made, two locomotives hauling the train. All the usual stops were made, and there was an unexpected break in-two test. The train parted on a summit, the rear end not having passed the summit. Both sections "stopped only a few yards apart." On the whole, the trials are taken as fully confirming former demonstrations of the "wonderful performance of the Westinghouse quick-acting brake."

General Passenger Agent D. G. Edwards, of the Queen & Crescent route, has issued a circular letter to connections, asking them to consider the advisability of discontinuing the sale of unlimited tickets to points on foreign roads. He states that his company has suffered materially from the misuse of this kind of tickets by their being collected and turned over to scalpers instead of being turned in with the ticket collections. He urges that the limited ticket answers all purposes of accommodation to the through passenger, and the unlimited through rates cumber the rate sheets, increase the work of the rate clerks, and add to the cost of issuing tariffs, without corresponding benefit to either carrier or patron.

Train Accidents in September.

(*Continued from page 753.*)

collision caused the death of 1 engineer and 4 other trainmen. A flagman was ordered to hold all trains but misunderstood his orders and allowed the wrecking train to pass him.

21st, on Pennsylvania, at Derry, Pa., collision between freight trains, injuring 3 trainmen.

23d, on Boston & Maine, at North Chelmsford, Mass., collision between a stock train and a freight, blocking the road 6 hours.

24th, on Georgia Southern & Florida, as Jasper, Fla., collision of freight trains, killing a brakeman and injuring 2 other trainmen.

25th, on Southern Pacific, at Aurora, Or., a freight train on a side track was broken apart just as a passenger train was passing, and some of the cars started down grade uncontrolled toward a switch which would let them on to the main track. A man stood at this switch intending to set it for the side track as soon as the passenger train passed, but he became excited and moved it too soon, derailing the rear car, which was struck by the freight train, and, together with several other cars, wrecked.

27th, on Baltimore and Ohio Southwestern, at Madisonville, O., a passenger train running at high speed struck a gravel train, badly damaging 2 baggage cars. Fireman killed.

29th, on Nashville, Chattanooga & St. Louis, at Nashville, Tenn., a switching engine bumped against a string of freight cars with sufficient force to start it down a grade. The cars ran to the end of the track and knocked down a butting post, several of them being thrown into the adjacent street.

30th, 5 a. m., at the junction near Painesville, O., a Pittsburgh, Painesville & Fairport freight train was not controlled on approaching the crossing, and ran into a New York, Chicago & St. Louis freight, damaging 4 cars of the latter and the locomotive.

30th, on Louisville & Nashville, near Warrior, Ala., collision between a freight train and a switching engine, wrecking both engines. One engineer killed and 3 trainmen injured.

DERAILMENTS.

DEFECTS OF ROAD.

2d, on Northern Pacific, near Eagle Grove, Wash., an eastbound passenger train was thrown from the track by a broken rail and a number of cars were derailed and badly wrecked, killing 2 and injuring 16 passengers.

5th, on Union Pacific, near One Thousand Mile Tree, Utah, passenger train derailed by a broken rail on a curve. The 3 rear cars were overturned in the ditch, injuring a passenger.

7th, on New York, Lake Erie & Western, at Hornellsville, N. Y., 10 cars of a Lehigh Valley freight train were thrown from the track by a broken rail and piled up in a bad wreck.

8th, on Missouri Pacific, near Russellville, Mo., a passenger car and a baggage car in a mixed train were thrown from the track and ditched by the spreading of the rails.

9th, on Louisville & Nashville, near Iron City, Tenn., engine of freight train derailed at a defective switch and overturned.

9th, on Missouri, Kansas & Texas, near Whitewright, Tex., a freight train was thrown from the track by the

spreading of the rails, wrecking 11 cars. One trainman killed and 2 injured.

12th, on Little Rock & Fort Smith, near Marche, Ark., an engine was derailed by a defective switch and overturned in the ditch, killing a brakeman and badly scalding the fireman.

13th, on St. Louis, Arkansas & Texas, at Camden, Ark., a bridge gave way under a freight train, the forward portion going down with it.

13th, Union Pacific, at Howells, Wy., The forward portion of a freight train was derailed by the breaking of a switch rod. The engine went over a 15-ft. embankment, killing fireman and injuring engineer and brakeman.

13th, on Boston & Albany, in Somerville, Mass., 5 cars of a freight train derailed at a frog and badly damaged.

17th, on St. Louis, Iron Mountain & Southern, near Goldens, Ark., a baggage car and a passenger car of a mixed train were thrown from the track by a broken rail and rolled down an embankment, injuring 15 passengers.

18th, on Missouri Pacific, near Pine Bluff, Ark., 2 cars and caboose of a freight train were thrown from the track by the spreading of the rails, dragged across a trestle and thrown into the ditch. Conductor and 5 men riding in the caboose were injured.

19th, on Central of New Jersey, at Elizabeth, N. J., 5 cars of a westbound freight were derailed at a defective switch and thrown against the locomotive of an eastbound passenger train, badly damaging the engine of the latter together with 3 of the freight cars. Engineer hurt.

20th, on Union Pacific, near North Powder, Or., fast passenger train derailed by the spreading of the rails, 7 passenger and 3 other cars being thrown into the ditch. The mail car caught fire, but the flames were soon extinguished.

21st, about 3 a. m., on Omaha & St. Louis, near Neoga, Ia., a freight train consisting of engine and 18 cars ran upon and broke through a burning trestle, going down 50 ft. in a bad wreck, the greater portion of which was burned up. Engineer, fireman and brakeman killed.

22d, on Union Pacific, near Potter, Neb., freight train derailed by a broken switch, wrecking 16 loaded cars.

22d, on Georgia Southern & Florida, near Jasper, Fla., freight train derailed by a broken rail, killing 1 passenger and injuring 3 others.

23d, on St. Louis & Hannibal, near Moscow Mills, Mo., a stock train broke through a bridge, wrecking 16 cars and killing half of the animals therein.

26th, on Southern Pacific, at Seguin, Tex., engine and 2 cars of freight train derailed at a defective switch.

DEFECTS OF EQUIPMENT.

1st, on Georgia Pacific, near Vandiver, Ala., a wheel under a car in the forward part of a freight train broke, and 15 cars were derailed and piled up in a bad wreck.

9th, on Pennsylvania, near Bellefontaine, Pa., passenger train derailed by the breaking of a locomotive wheel. The engine went over an embankment, badly scalding the fireman.

13th, on Texas & New Orleans, near Beaumont, Tex., a car in a freight train loaded with lumber broke down, and 4 cars were derailed and wrecked.

18th, on Chicago, Santa Fe & California, at Carrollton, Mo., a drawbar pulled out of a car in a freight train, and half a dozen cars were derailed and wrecked. Of 5 tramps riding in one of the cars 2 were killed and 2 injured.

18th, on Chicago, St. Paul, Minneapolis & Omaha, near Sibley, Ia., a journal under a car in a freight train broke, and 5 cars were derailed and damaged.

20th, on Housatonic road, near Hawleyville, Conn., smoking car of passenger train derailed by a broken axle.

21st, on Kansas City, Memphis & Birmingham, near Byhalia, Miss., several cars of freight train derailed by the breaking of a truck.

22d, on Baltimore & Ohio, near Barnesville, O., 10 cars of a freight train derailed and wrecked by a broken axle.

22d, on Union Pacific, near Green River, Wy., engine of freight train derailed by the dropping of the cow catcher.

24th, on Southern Pacific, near Houston, Tex., 4 cars of freight train derailed by a broken axle.

25th, on Northern Pacific, near Crocker, Wash., a log train was derailed by the breaking of a car, piling up a bad wreck in a cut.

26th, on Union Pacific, near Juab, Utah, journal under a car in a freight train broke and a number of cars were derailed and damaged. Brakeman slightly injured.

27th, on Union Pacific, at Waucanza, Idaho, a car in a freight train was derailed by a broken axle.

27th, on Southern Pacific, at Woodburn, Ore., freight train derailed by a broken brake beam, wrecking 6 cars.

28th, on Cleveland, Cincinnati, Chicago & St. Louis, near Grant, Ind., freight train derailed by a broken truck, blocking the road several hours.

30th, on Augusta & Knoxville, near Augusta, Ga., 2 cars of a freight train derailed and damaged by a broken truck.

30th, on Philadelphia & Reading, near Phœnixville, Pa., an axle under a car in a freight train broke in Black Rock tunnel and about 20 cars were derailed and wrecked, blocking the road for some time.

NEGLIGENCE IN OPERATING.

1st, on Lake Erie & Western, at Newcastle, Ind., an empty engine, which had been abandoned by the engineer when a collision seemed imminent at a junction, ran backward some distance through the yard and was derailed. The derailment barely averted a collision with a passenger train.

2d, on New York, New Haven & Hartford, at Cos Cob, Conn., an eastbound passenger train, the speed of which was not properly controlled, ran past the home signal for the drawbridge and was derailed at the safety switch.

2d, on New York, New Haven & Hartford, at Holyoke, Mass., yard engine derailed in attempting to make a flying switch.

4th, on Union Pacific, near Ironton, Utah, a freight train descending a grade became uncontrollable and was derailed at a curve, wrecking 5 cars. Brakeman injured.

4th, on Atlantic & Pacific, at Albuquerque, N. M., passenger train derailed by a misplaced switch, wrecking several cars. Engineer and a passenger injured, the former fatally.

4th, on Pennsylvania, in Philadelphia, engine of a freight train was derailed by an unfastened switch and overturned in the ditch. Engineer and fireman killed, conductor injured.

9th, on Pennsylvania, at Philadelphia, a freight train ran over a misplaced switch and into a coal yard, doing some damage.

11th, on Southwestern, at Americus, Ga., a switching engine standing on a siding was started by some mischievous person and ran out upon the main track, where it was derailed and overturned.

11th, on Baltimore & Ohio, near Linden, Md., a log rolled off a car in a mixed train and fell in such manner as to derail a number of cars, including a mail car and a coach, which were thrown on their sides across the track.

13th, on Pittsburgh, Virginia & Charleston, in Pittsburgh, Pa., passenger train derailed at a misplaced switch.

15th, on Denver & Rio Grande, near Lower Crossing, Col., engine and tender of freight train derailed by a misplaced switch.

16th, on Cincinnati, Wabash & Michigan, near Sodus, Ind., 8 cars of a freight train were derailed by some telegraph poles rolling off the foremost one and lodging upon the track.

18th, on Central Pacific, near Arcade, Cal., 25 cars of a freight train were derailed and a number of them badly damaged by a block of granite on one of them becoming dislodged and falling upon the track.

25th, on St. Louis, Iron Mountain & Southern, at West Memphis, Ark. a locomotive going out of a roundhouse got beyond control of the hostler on an incline and plunged into the Mississippi River.

UNFORESEEN OBSTRUCTIONS.

1st, midnight, on New York Central & Hudson River, near Poughkeepsie, N. Y., a freight train was derailed by a misplaced switch, the engine and 5 cars going over an embankment. It is said that the switch had been maliciously misplaced and the lights extinguished.

2d, on New York, Ontario & Western, at Mayville, Pa., a freight train ran over a cow and a number of cars were derailed and thrown against an adjacent building, which was knocked off its foundation and badly damaged, killing an occupant.

4th, on Houston & Texas Central, near Manor, Tex., a mixed train ran into some cattle which had got caught on a bridge, derailing engine and 8 box cars.

4th, midnight, on Louisville, New Orleans & Texas, near Vicksburg, Miss., a passenger train was derailed at a point where fastenings had been maliciously removed from a rail. The entire train except the sleeping cars went over an embankment, the tender and baggage car landing bottom side up. Engineer, conductor and 2 passengers injured.

4th, midnight, on New York Central & Hudson River, near Castleton, N. Y., northbound passenger train derailed by a malicious obstruction, consisting of short pieces of 65-lb. rails wedged between the sleepers at a culvert. The train was running 30 miles an hour and the whole of it was derailed, some of the car bodies being thrown across the ditch. The passenger cars were all sleepers, and only 3 passengers were injured and none killed. The company offered a reward of $5,000 for the detection of the criminals and 5 men were arrested, but nothing has been proved against them and all of them have been released.

4th, on Union Pacific, near Dome Rock, Col., a freight train ran into a landslide in a cut on a curve, and the locomotive and 3 cars were thrown from the track against the side of the cut and badly wrecked. Engineer killed, fireman and brakeman fatally injured.

5th, on Missouri, Kansas & Texas, near Caney, I. T., a freight train was derailed and wrecked at a switch which had been tampered with. Engineer and 4 tramps killed, fireman badly scalded. The wreck caught fire and was burned up.

5th, on Atlantic & Pacific, near Hualapai, Arizona, freight train ran over a cow, derailing engine and several cars killing the fireman.

7th, on Black Hills & Fort Pierre, near Piedmont, S. D., a passenger train ran into a mass of rock which had fallen upon the roadbed from an overhanging cliff. Engine and several cars derailed and damaged.

11th, on Pittsburgh, Fort Wayne & Chicago, near Loudonville, O., the fourth section of freight train No. 93 was derailed by a landslide, 3 cars going into the ditch. Engineer injured.

11th, on Richmond & Danville, near Westminster, S. C., passenger train derailed by a landslide, badly damaging the engine and mail car.

13th, on Chesapeake & Ohio, at Norwood, Va., a freight train ran into and was derailed by a landslide. One trainman killed, 3 injured.

14th, midnight, on Cincinnati, Hamilton & Dayton, in Lima, O., two cars of a switching freight train were derailed by running over a man. Two trainmen were thrown from the cars, one of them being killed and the other badly hurt.

17th, on Buffalo, Rochester & Pittsburgh, near Wyoming, N. Y., the greater portion of a freight train was derailed and damaged at a switch which had been maliciously tampered with.

18th, on Southern Pacific, near Del Rio, Tex., freight train ran over a cow, derailing the entire train.

19th, about 6:15 p. m., on Philadelphia & Reading, near Shoemakersville, Pa., northbound express train No. 3 derailed by the wreck of a freight train which had been thrown over from the southbound track a moment before. The engine and 5 cars were thrown down a high bank into the Schuylkill River, making a very bad wreck. Twenty-one passengers and 1 employé were killed and 25 passengers and 5 employés injured. This accident was reported in the *Railroad Gazette* of Sept. 26.

21st, 2 a. m., on Cleveland & Pittsburgh, near Rockwood, Pa., engine and 12 cars of a freight train derailed and wrecked, many head of live stock being killed. Fireman injured. It is said that a rail has been maliciously loosened.

23d, on Union Pacific, near Cape Horn, Or., a freight train ran over a cow and the forward portion was derailed and wrecked.

25th, on Newport News & Mississippi Valley, near Dyersburg, Tenn., freight train ran over a cow, derailing a number of cars.

26th, on Baltimore & Ohio, near Johnstown, Pa., engine and 8 cars of a freight train were derailed by some stones which had been maliciously piled upon the track.

27th, on Seattle, Lake Shore & Eastern, near Wayne, Wash., freight train derailed by a tree which had been blown across the track.

28th, on Chicago & Northwestern, near Eldora, Ia., a freight train nearing a trestle was derailed by a cow and the engine and 9 cars were thrown off the trestle and totally wrecked. Lime in a car next to the engine was slaked by the water from the broken tender and fired the wreck, which, together with the trestle, was destroyed. Fireman injured.

29th, on Dayton, Fort Wayne & Chicago, near Convenience, O., engine and 13 cars of freight train derailed and wrecked by running over a cow.

29th, on Eastern Alabama, near La Grange, Ga., engine of a passenger train derailed by an obstruction which had been maliciously placed in a cattle guard.

30th, on Canadian Pacific, near Greenville Junction, Me., engine and several cars of passenger train derailed, the engine being overturned by a pile of sleepers which had been maliciously placed on the track. Engineer fatally and several passengers slightly injured.

UNEXPLAINED.

2d, on Florida Central & Peninsular, near Gainesville, Fla., engine and box car of a mixed train were derailed, the former being upset in the ditch.

2d, on Boston & Albany, at North Grafton, Mass., freight train derailed.

2d, on Pennsylvania, at East Liberty, Pa., 2 cars of a switching freight train derailed.

2d, on New York, Lake Erie & Western, at Hawthorn, N. J., freight train derailed and several cars wrecked.

3d, on East Tennesse, Virginia & Georgia, near Cochran, Ga., mixed train derailed. Engineer hurt.

4th, on Louisville & Nashville, at East St. Louis, Ill., 2 coal cars of a switching freight were derailed on a bridge and tipped off into a creek.

4th, on Northern Pacific, at North Fork, Wash., several cars of a freight train containing emigrants and their effects were derailed at a switch and overturned.

4th, on Victoria & Western, near Rockbridge Alum Springs, Va., passenger train derailed and several cars overturned, injuring a passenger.

5th, on Columbus & Western, at Trammel's, Ga., engine of freight train derailed.

5th, on Blue Ridge & Atlantic, near Demorest, Ga., a freight train approaching a bridge was derailed and the engine and 2 cars went through the bridge into the creek below.

5th, on International & Great Northern, near Chenango, Tex., 4 cars of a mixed train derailed.

6th, on Huntsville Belt Line & Mt. Sano, at Huntsville, Ala., empty car of passenger train derailed and overturned.

6th, on Texas & Pacific, near Baird, Tex., 15 cars of a freight train were derailed and damaged.

6th, on Richmond & Danville, near Salisbury, N. C., a freight train was derailed at and broke through the bridge over the Yadkin River, the entire train except the caboose going down 60 ft. Three trainmen injured.

9th, on New York, Chicago & St. Louis, near Hammond, Ind., an engine hauling an officer's car was derailed, injuring the fireman.

10th, on Northern Pacific, near Willows, Wash., 4 cars of a construction train were derailed and badly wrecked.

11th, on Savannah, Americus & Montgomery, near Richland, Ga., 2 cars of a freight train were derailed and one of them was badly wrecked.

11th, on Baltimore & Ohio, at Wilmington, Del., 7 cars of freight train derailed.

12th, on Central of Georgia, near Vandiver, Ala., freight train derailed.

13th, on Missouri Pacific, near Glencoe, Mo., the 3 rear cars of a passenger train were derailed at a switch, thrown down an 18-ft. embankment, and badly wrecked, injuring 24 passengers.

13th, on Georgia Pacific, at Eden, Ala., several cars of a freight train derailed, blocking the road for a long time.

14th, on Montana Union, near Butte, Mont., a switching freight train was derailed on a siding, knocking down a high brick smoke stack adjacent to the track, which fell upon and badly wrecked the engine. Engineer killed, fireman seriously injured.

14th, on Union Pacific, at McCammon, Utah, construction train derailed and wrecked. Fireman and a laborer killed, engineer, brakeman, and a number of laborers injured.

15th, on Georgia Pacific, near Columbus, Miss., freight train derailed and 9 cars badly wrecked, seriously injuring a brakeman.

15th, on Cincinnati & Muskingum Valley, at Reeds, O., freight train derailed. Engineer killed, fireman injured.

15th, on Northern Pacific, at Meeker, Wash., several cars of a freight train loaded with logs derailed at a switch and wrecked.

16th, on West Shore road, in North Syracuse, N. Y., tender of engine of an excursion train, the locomotive of which was running tender first, jumped the track and dragged 3 coaches after it. A man riding on the platform of one of the cars was killed and the fireman slightly injured.

18th, on Kansas City, Memphis & Birmingham, near Amory, Miss., engine and baggage car of passenger train derailed. Engineer hurt.

21st, on Union Pacific, near Ogden, Utah, two cars of freight train derailed and ditched.

22d, on Cincinnati, Hamilton & Dayton, at Lima, O., 2 cars of a switching freight derailed at the crossing of the Pittsburgh, Fort Wayne & Chicago, blocking both roads several hours.

22d, on International & Great Northern, near Overton, Tex., mixed train derailed on a curve the passenger car being overturned and thrown down a bank. Twenty-five passengers were injured, 3 of them seriously. The car took fire apparently from a lamp and was burned up.

23d, on Grand Rapids & Indiana, at Grand Rapids, Mich., car of passenger train derailed.

24th, on Boston & Maine, at Nashua, N. H., switching engine derailed and overturned in a canal. The engineer was injured and thrown into the water, but he swam out.

24th, on Central of Georgia, at Hurtsboro, Ala., engine of freight train derailed.

24th, on Kansas City, Memphis & Birmingham, at Birmingham, Ala., passenger train derailed, blocking the road several hours.

24th, on Lynchburg & Durham, near Dunham, N. C., construction train derailed. An employé in jumping from the train was caught under the cars and killed.

25th, on Georgia Pacific, near Winston, Ga., freight train of 18 cars derailed and ditched, one brakeman being injured.

25th, on Maine Central, at Lewiston, Me., engine and one car of passenger train derailed.

26th, on Western & Atlantic, at McIvors, Ga., passenger train derailed at a curve, nearly all the cars being overturned. Fireman killed and 3 other trainmen injured.

27th, on Pennsylvania, near Shippenville, Pa., engine and several cars of freight train derailed and ditched, killing engineer, fireman and a brakeman.

27th, on Chateaugay Railroad, near Standish, N. Y., 2 cars of passenger train derailed and thrown down a small embankment. They were filled with passengers, but none was seriously injured.

27th, on Union Pacific, at Salt Lake City, Utah, 2 cars of a passenger train derailed and ditched. Several passengers were slightly injured.

28th, on Port Royal & Western Carolina, near Green-

wood, Ga., 10 cars of freight train derailed and one employé injured.

28th, on Gulf, Colorado & Santa Fe, near Berwyn, I. T., 4 cars of a freight train derailed at a curve, making a bad wreck.

29th, on Georgia road, near Union Point, Ga., 18 cars of a freight were derailed at a switch and piled up in a very bad wreck. The debris was fired by the explosion of a car load of powder and totally consumed.

OTHER ACCIDENTS.

10th, on New York, New Haven & Hartfort, at East Bridgeport, Conn., a westbound express train running at high speed broke in two by the pulling out of a drawbar from the front end of a drawing-room car. The car was lifted a considerable distance, but dropped back upon the rails.

11th, on Richmond & Danville, at Harbins, S. C., a passenger train ran into a boulder which had rolled down upon the track, damaging engine and tender and tearing away all the car steps on one side of the train.

12th, on Chicago, Milwaukee & St. Paul, near Rockton, Ill., a freight train ran into a hand car loaded with rails, badly damaging the engine.

13th, on Black Hills & Fort Pierre, near Lead City, S. D., a large tree fell upon and badly wrecked the last car of an excursion train passing through a cut, killing 3 persons and injuring several others.

15th, on Norfolk & Western near Concord, Va., engine of a freight train exploded its boiler, killing fireman and injuring engineer and brakeman.

19th, on West Jersey, at Burleigh, N. J., a switching freight train ran over a misplaced switch, demolishing a hand car and damaging engine and several cars. A sectionman had just opened the switch for the purpose of running a hand car on to the siding.

19th, on Kansas City, Wyandotte & Northwestern, at Lansing, Kan., locomotive of a passenger train was struck by lightning.

21st, on East Tennessee, Virginia & Georgia, at Sherman Heights, Tenn., boiler of freight engine exploded, killing engineer and fireman. The engine was badly wrecked, most of it being thrown 300 ft. from the track.

22d, on Pennsylvania, at Wilmerding, Pa., 6 sleeping cars in a passenger train badly damaged by the lading of a freight car on a side track which did not clear the main track.

30th, on Georgia Railroad, at Teareys, Ga., a carload of sulphur in a freight train took fire and exploded, setting fire to several other cars, and causing the destruction of 18 loaded cars altogether.

A summary will be found in another column.

TECHNICAL.

Manufacturing and Business.

The plant of the Ryan & McDonald Manufacturing Co. of Waterloo, N.Y., will soon be transferred to South Baltimore, Md. on Curtis Bay, adjoining the South Baltimore Car Works. The company well put up a building 70 × 350 ft. and employ from 100 to 150 men in the manufacture of contractors' supplies, hoisting machinery, contractors' cars and derricks.

The Pratt & Whitney Co., of Hartford, Conn., is to erect a new factory building, to be 300 × 45 ft. and two stories high.

It is stated that the Rockbridge Co. has contracted for the building of the steel car works plant of the American Fire Proof Steel Car Co., at Glasgow, Va.

The Pittsburgh Metallurgy Co. has put in one of M. V. Smith's patent fuel gas plants at the La Belle Iron Works in Wheeling. Natural gas proved unsatisfactory because of the irregular supply.

The Moran Bolt & Nut Manufacturing Co. has orders for nine car-loads of bolts and nuts; two car-loads going to M. M. Buck & Co.; three car-loads to W. A. Styles, at Louisiana; the St. Louis, Arkansas & Texas Railroad, one car; E. P. Reynolds & Co., contractors for the Missouri Pacific railroad, two cars and one car of small orders.

Thos. Carlins' Sons, of Allegheny, Pa., report recent sales of grinding pans and other equipments to the Wheeling Steel Works, of Wheeling, one 9 ft. ore pan; Riverside Iron Works, Wheeling, 7 ft. ore pan with engine attached; one 5 ft. pan to Pratt & Letchworth, of Buffalo, N. Y.; Hamsworth Steel Co., one 7 ft. pan with engine attached; and also a complete contractor's plant to Ashland, Ky.

The Griffin Car Wheel Works, of Buffalo, N. Y., it is said, contemplates erecting car-wheel works in Middlesborough, Ky. A stock company will probably be organized to erect car works at the same place. The Middlesborough Town Co., will be interested in both enterprises.

The two immense cranes in course of construction by William Sellers & Co., of Philadelphia, for Baldwin's Locomotive Works, will soon be ready. The cranes are being built in the shape of two large bridges, running upon tracks, with two trolleys, each capable of lifting 50 tons. Two 40 H. P. electric motors are to be used in operating each crane. The motors are carried on the bridges, and the electricity conveyed to the cranes through two copper rods. The cranes are capable of running along the shops at the rate of 200 ft. per minute, the hoists from 5 to 40 ft. per minute, and the carriages will run across the bridges at 100 ft. per minute. The company will also build three smaller cranes for the same works, all to be operated by electricity.

The Western Locomotive Co. has filed articles of incorporation at Seattle, Wash. The company is to manufacture and lease locomotives and portable engines. The capital is placed at $2,500,000. Seattle will be the principal place of business. John L. Ayer, Joseph Hadurger and F. D. Burton are the incorporators.

At the recent annual meeting of the stockholders of the McLeod Car Heating Co. the following were elected directors: J. B. McLeod, George R. Brine, Henry Hartley, all of Boston; R. L. Pettit, of Philadelphia; J. L. Robertson, of New York. The invention has not yet been practically tested on any railroad, but the apparatus is now complete, and it is being put upon the cars of the Staten Island road with as much dispatch as possible. The company has an office at 125 and 127 Worth street, New York.

The Eastman Car-Heater Co. has recently completed a contract by which it will soon have over 1,800 cars running. The New York & New England has ordered 50 more for this winter, the Lehigh Valley Road 150, and the Baltimore & Ohio 100 cars.

A company has been formed at Newport, Ky., with a capital of $250,000, to manufacture aluminum at a nominal price. The process involves the use of calcium fluoride for flux and a little calcium carbonate in a jacketed furnace. It requires about 36 hours to make the first slab. The metal can be produced, it is said, at less than 10 cents per pound.

The Straight Iron Fibre Co., of Chicago, shut down its puddling and bar mills last week and refused to give any reasons for the action or to state when operations would be resumed.

The Widdifield Electric Brake Co. has received letters of incorporation from the Ontario Government with Anson T. Button and W. P. Widdifield, of Uxbridge, Ont.; S. E. Fuller, of Stratford, Ont.; James Lockhart, S. E. McKinnon, T. R. Fuller, and Hugh Blain, of Toronto, as incorporators. The capital stock is $300,000, and the office at Toronto.

Iron and Steel.

The furnace now being built by the Max Meadows Iron Co., at Max Meadows, Va., will be 75 ft. high, with 17-ft. bosh, and is expected to produce 125 tons daily. The foundations are about completed, and the cast house is erected. E. P. Allis & Co., of Milwaukee, have shipped the engines which will furnish power for the plant, and the furnace will be ready for blast about June 1. The coke supply will be obtained from the Pocahontas Flat Top fields.

The universal and bar mill departments of the Millvale Rolling Mill, at Pittsburgh, formerly operated by Graff, Bennett & Co., and which has been idle since the failure of that firm several years ago, were put in operation recently. It is expected that about 2 0 men will be given employment. The plant is being operated under lease by the Millvale Iron Co., Ltd.

Contracts have been signed for the construction of a steel plant at Tredegar, Ala. It is to be completed by May 1, 1892. There will be three furnaces, 117 ft. high, 26 ft. 8 in. at base and 20 ft. at top. There will also be a complete rolling mill plant. The ore will be sent to the furnace on gravity cars from a point near the town.

It is reported that O. W. Potter, of Chicago, has purchased a controlling interest in the Illinois Steel Co. The company is a corporation with an authorized capital of $25,000,000 and about $17,000,000 in stock has been issued. Convertible five per cent. bonds are also on the market to the extent of $5,000,000. Transfers of stock were made this week at 92, and later at 125.

The plant of the Spaulding Iron Co., at Brilliant, O., is being operated by the Brilliant Iron & Steel Co., of Wheeling, W. Va. The puddling department, consisting of 20 furnaces, is all that is in operation, and about 50 tons of muck iron are being turned out per day. George K. Wheat is President and Alex. Updegraff is Secretary of the company.

The Laurel Iron Works, formerly operated by J. W. Carmichel, but which have been idle for more than a year, were sold at Coatesville, Pa., Oct. 24, for $47,000, H. A. DuPont, of Wilmington, Del., being the purchaser.

Work has been commenced on the construction of the Ashland Steel Co.'s steel plant at Ashland, Ky.

A portion of the plant of the Youngstown Rolling Mill Co., in Youngstown, O., was destroyed by fire last week. The loss is $100,000.

On account of a business disagreement between the stockholders, a bill has been filed in chancery asking that a receiver be appointed for the Mary Pratt Furnace Co., of Birmingham, Ala., and property sold. The property consists of about 32 acres of land in Birmingham, the Mary Pratt furnace plant, consisting of one stack 14 × 65 ft., rebuilt in the spring of 1889; three Whitwell hot blast stoves, two 72 in. blowing engines, eight boilers, brick casting house with iron roof, etc. Valuable contracts for ore, coke and limestone, which have several years yet to run, will go with the property. A bonded debt of $100,000, bearing seven per cent. interest, was placed upon the property in 1889, and has nine years yet to run.

The Rail Market.

Steel Rails.—The market seems to be weak and even demoralized. It is not stated what action was taken at the recent manufacturers' meeting, but a serious disagreement is rumored. Reports are numerous of orders being taken under the quoted prices. The quotations are given as at about $29 at Eastern mills, for orders for 15,000 tons; $30 is also quoted. The Chicago quotations are $32@$32.50.

Old Rails.—Quotations are at New York $25, $25.50@$26 for tees; at Pittsburgh, $28 for old iron rails and $19@$20 for steel rails; at Chicago, $26 for old iron rails and $17@$20 for old steel rails, according to length.

The Burton Stock Car Co.

The Burton Stock Car Co. is building at its works at Wichita, Kan., 60 of its latest pattern cars for transporting either horses or cattle. The company also recently completed five of the perfected horse cars. It is making additions and improvements to its plant at Forty-seventh and Morgan streets, Chicago, and has erected a building 36 × 24 ft., for a blacksmith shop, which is covered with corrugated sheet iron. New machinery has been added, consisting of bolt cutters and lathes, and a Westinghouse air pump, with an underground pipe running the entire length of the plant, nearly one mile, for the purpose of testing the air brakes on cars undergoing repairs.

Interlocking.

The Union Switch & Signal Co. has nearly completed a 68-lever machine for the Michigan Central, to be set up at Bay City Junction. This machine has features never before used in interlocking, and is considered by the builders the most advanced example of interlocking in the world.

Locomotives for South Australia.

The Commissioner of Public Works of South Australia has telegraphed to England to see at what date 19 locomotives can be delivered there. On being questioned, in the House of Assembly, by those who wished the engines built by colonial manufacturers, he said if they can be delivered in time for the next harvest he should have to order them from England, as the Railway Commissioners required them then; but if they cannot be delivered from England by that time they may be tendered for in the colony. The feeling in the colony is very strong against importing locomotives.

A New Steel Steamer.

The steel steamer "Mackinaw," constructed in the United States, has reached Montreal. The vessel of 2,500 tons, and entirely of steel, was constructed at Bay City, Mich., by the Saginaw Steel Steamship Co., and is intended for the ocean freight trade. It came down by way of the lakes, and at Buffalo was cut in two and towed down through the canals to Montreal, where it is now being put together again, and will then proceed by way of the St. Lawrence and the gulf to New York. It took four tugs to tow it down, and it was 11 days on the way.

Improving the Chicago Lake Front.

Specifications have been prepared for filling and piling the lake front at Chicago by the World's Fair Directors' Executive Committee. Eighty-nine acres of fair space are to be redeemed from the waters of Lake Michigan. Forty-four acres are to be filled solid and 45 built on piling.

A New Train Signal.

An exhibition of a new train signal was given on the Old Colony road on the 23d inst. The system consists of a pneumatic bell-ringing apparatus, in which air pumps, located under the hood at each end of the car, are connected by an iron pipe running along the roof of the car—with flexible connections between cars—with an air chamber located near the bell in the cab, the chamber having a flexiole diaphragm connected with the mechanism for ringing the bell. A cord, similar to the bell cord, passing through the car, is connected to the piston of the air pump. By pulling the cord a vacuum is created in the pipe which moves the diaphragm in the cab and rings the bell. There is a connection between the cars which automatically rings the bell in case the train breaks apart. A train of four cars equipped with this device left the Old Colony station, Boston, at 10 a. m., having on board railroad officials, newspaper men and others. A run to South Braintree and return was made, during which time the signal was frequently tested and found to work satisfactorily. It was invented by Charles Parent and is controlled by the Parent Pneumatic Bell Alarm Co., 34 School Street, Boston.

Smith Feed Water Heater and Purifier.

A suit for infringement of patent, brought against the Smith Feed Water Heater & Purifier Co. by the Heine Safety Boiler Co., in a United States Circuit Court of Missouri, has recently been decided in favor of the defendant.

This heater and purifier, or mud drum, is a well-known device, having been in use for some time. It consists of a tubular vessel nearly as long as the boiler, which is suspended within the boiler, and is divided from end to end by a diaphragm into two separate chambers. The feed water is introduced into the lower chamber at one end, it then flows through the lower compartment to the far end, rises through holes in the diaphragm to the upper chamber, flows back through that chamber to the entering end, and passes through holes in the top shell of the chamber into the boiler. It is also provided with a blow-off for removing the sediment.

THE SCRAP HEAP.

Notes.

Train robbers took $1,500 from passengers on a train of the Atchison, Topeka & Santa Fé, near Socorro N. M., Oct. 23.

The "Mackey roads" in Indiana have come to an amicable settlement with the engineers, firemen and conductors, who asked for higher wages.

The Canadian Minister of Customs has refused the request of the National Dispatch for permission to take car wheels into Canada for repairs free of duty.

The Big Four Mutual Insurance Association held its twenty-second annual meeting in Indianapolis Oct. 22. The association has 1,787 members. The resignation of Robert Blee as President was declined, and he was re-elected.

Capt. J. H. Smith, Abner Doble and J. J. Scrivner have formed a company to establish a ferry line to be operated in connection with the Colorado & Nevada road, which is largely owned by Capt. Smith. The ferry line is to be operated between San Francisco and North Oakland.

The Union Pacific is to establish a large freight yard at Jersey, near Denver, where trains will be distributed, the cars being taken thence to the city by switching engines. It appears that a considerable share of the delays and inconvenience suffered in the local freight work at Denver during the last year has been owing to lack of room.

William F. Murdock, of Lynn, Mass., has been sentenced to nine years in state prison for placing a rail on the track of the Boston & Maine road at Saugus, Mass., on the night of Sept. 8. Murdock signaled a train and stopped it, pretending he had discovered a malicious attempt at wrecking, but afterward confessed that he did the work himself, hoping to obtain a reward.

Exporting Railroad Material to an English Colony.

The bark "Leopoldo," for Cape Town, Africa, and the brig "Havilah," for East London, sailed from New York this week, having on board railroad freight, principally track material, to the value of $20,000, which had been purchased in this country for the government roads in Cape Colony. This shipment will be followed by others. Orders for cars and locomotives have been placed in the United States with the Iron Car Co. and the Baldwin Locomotive Works. The material exported this week was shipped by Mr. W. Berliner, No. 69 Mercer street, New York, who is the government agent in this country for the purchase of the railroad material.

Street Railroads.

Mr. H. Meek, C. E. Palmer and W. J. Landers were granted a franchise last week by the Alameda County supervisors to construct and operate an electric railroad from the city of Oakland, Cal., to the town of Haywoods, a distance of 13 miles along the county road.

Scrap Iron.

Sealed tenders, addressed to D. Pottinger, Chief Superintendent, Intercolonial Railroad, Moncton, N. B., will be received next week for the purchase of the following: about 500 tons scrap wrought iron No. 1, 500 tons scrap chilled car wheels, 70 tons scrap brass, 100 tons scrap cast iron, five locomotive boilers, one new anchor weighing about 3,800 lbs. and two anchors weighing about 400 lbs. each.

The Pancoast Ventilated Car.

Fruit cars with the Pancoast patent ventilator have been used with marked success in carrying bananas from the south to Cincinnati, and grapes from Western New York to Philadelphia. The *Fruit Trade Journal* states that grapes come out of these cars perfectly dry

and superior in soundness and in cleanness of packages to those carried in refrigerator cars.

The New England Coal Trade.

The second of a fleet of tugboats for the Norfolk & Western Railroad has just been completed at one of the Delaware River shipyards. It is 135 ft. long, and is expected to tow two loaded coal barges of 2,000 tons capacity each from Norfolk to New England ports. The company intend to procure 10 towboats and 30 barges, which will carry about 600,000 tons a year from Newport News to points beyond Cape Cod. An additional coal pier is to be erected at Norfolk to accommodate the increased traffic.

The Elizabeth Coal Docks.

The Central of New Jersey is reported to have purchased the property at Elizabethport, N. J., owned and formerly operated by the Delaware, Lackawanna & Western, and comprises several acres, on which there are built five coal wharves. Since the Lackawanna moved its wharves to Hoboken the plant has been idle, with the exception of a couple of years that it was operated by the Philadelphia & Reading. The Central of New Jersey, it is asserted, proposes to resume coal shipping on an extensive scale, and will repair the docks in first-class condition. The price paid for the property is said to be $250,000.

A Large Elevator for the Canadian Pacific.

The Canadian Pacific is building at Richford, Vt., one of the largest grain elevators in New England. It will have a capacity of 500,000 bushels of grain. A large quantity of grain is being shipped over the St. Paul & Minneapolis, Sault Ste Marie road from the American and Canadian northwest districts to the New England States, and in order to release the large number of cars engaged in the exportation more quickly it was deemed advisable to have a more central elevator in Vermont from which the grain could readily be distributed throughout the New England States.

Testimonial to H. K. Porter & Co.

The firm of H. K. Porter & Co., of Pittsburgh, locomotive builders, has voluntarily reduced the working hours of its employés from 10 hours to nine hours a day and has continued the old rate of pay, and has considered as extra time one hour of each day for the six weeks preceding the notice of the change. The notice was a surprise to the employés and such a change had not been thought of among them. Soon after the notification was received from the firm the employés organized a mass meeting, which was attended by all the men, and a letter was written to the firm to express their appreciation of their generous action; to thank them and to "assure you that we will endeavor by diligent and faithful service, by careful attention to the details of our various occupations and by constant effort, to improve the quality and increase the amount of our daily output, to still further deserve your confidence in us and to repay you in some degree for this and previous acts of friendship." The employés give special credit to Mr. H. M. Sprague, the Superintendent, for his efforts in their behalf.

The British Iron and Steel Institute in Canada.

The following is the programme of the Canadian excursion given to the members of the Iron and Steel Institute of Great Britain and the German Association of Iron Workers by the Dominion government. Wednesday, Oct. 29, the party left Niagara Falls about nine o'clock a. m. via Hamilton for Toronto, arriving at noon. In the evening the party left Toronto by special train, containing four Pullman sleeping cars, for Sudbury. Thursday, after breakfast at Sudbury, the day was spent in visiting the mines and works of the Canadian Copper Company, the Dominion Mineral Company, and H. H. Vivian & Co., of Swansea. After supper the party took the train for Ottawa, which will be reached in time for breakfast. Friday, at Ottawa, the party will be driven to the City Hall, where a welcome will be extended by members of the Reception Committee of Her Majesty's Privy Council for Canada, and an address presented by the Mayor on behalf of the Corporation of the city of Ottawa. In the afternoon the visitors will be driven to points of interest in and around the city, visiting the Chaudiere Falls, the Lumber Mills, Eddy's Match and Pulp Factories, the City Water-works, and other public buildings. In the evening the members of the party are invited to an "At Home" in the Russell House. Saturday, the party will visit the offices and museum of the Geological Survey of Canada, the Fisheries Exhibit, Art Gallery, Parliament and other government buildings. At 1:30 p. m. the members are invited to a luncheon in the Russell House, given in their honor by the Reception Committee of the Privy Council, to be presided over by the Governor-General, Lord Stanley, of Preston. At 4:20 p. m. the party will take special train via Canadian Pacific Railway to Montreal, arriving at that place in time for supper. Monday, arrangements are being made by the Reception Committee of the Montreal City Council in conjunction with the Board of Harbor Commissioners, the Canadian Society of Civil Engineers, and other corporate bodies, for the entertainment of the party, and to give them an idea of the city's public works, its drives, harbor accommodation and other features of interest. Tuesday the party will leave Montreal at 4:20 p. m. from the Grand Trunk station, via Central Vermont road, for New York, arriving at Grand Central station on Wednesday at 7 a. m. Ample time will be allowed for supper at St. Albans, en route, special arrangements for which have been made in advance.

LOCOMOTIVE BUILDING.

The Chicago, Burlington & Quincy is reported in the market for 50 engines, and the Jacksonville Southeastern line has also asked bids for new locomotives.

The Jacksonville Southeastern Line is asking bids on 15 locomotives. Five of them are to be 6-wheel switching engines, five 10-wheel heavy engines, with 56-in. wheel centres that can be used either on passenger or freight, and five mogul engines for freight service.

The Baldwin Locomotive Works were awarded a contract this week for 11 switching engines for the Denver & Rio Grande.

The Richmond Locomotive & Machine Works, of Richmond, Va., received an order this week for 10 engines for the Louisville Southern. Six of them will be passenger, three freight and one switching.

Two new engines for the Chautauqua Lake road ordered from the Gloversville shops recently have been put in service.

Two engines for the Wabash road, part of an order of 12, being built in the Rhode Island shops, at Providence, R. I., have been sent to Springfield, Ill.

H. K. Porter & Co., of Pittsburgh, have just completed the smallest locomotive ever built by the firm. This locomotive is 23½ in. gauge, with 5 × 10-in. cylinders. It has four driving wheels 22 in. diameter, and the entire weight is about three tons. The engine is to run inside the buildings of the Otis Steel Co. at Cleveland, where it will haul the blooms to the rolls.

The Kingston Locomotive Works are building five 10-wheel locomotives for the Canadian Pacific, weighing 50 tons. These works are also building ten heavy mogul engines for the Grand Trunk. Four locomotives, which with the side tanks will weigh 90 tons, have just been commenced for the Chignecto Marine Transport Railroad, and five eight-wheel locomotives, 43 tons weight, will also be built without orders. These, with other small contracts, are expected to keep the works busy till the middle of 1891. There are 300 men employed.

CAR BUILDING.

The Louisville Southern has placed an order for 6 passenger cars, two combination, one baggage and one mail, express and baggage car with the Ohio Falls Car Works, of Jeffersonville, Ind.

The Denver & Rio Grande this week gave an order for 100 fruit cars, which it is understood went to the Pullman Car Co.

The Baltimore & Ohio has postponed the award of the 500 coal cars and 100 refrigerator cars of the Wickes patent, recently bid on.

The Philadelphia & Reading is reported to have given an order for 5,300 cars to the Pullman Car Co., but the report cannot be verified in Philadelphia.

The New York, Ontario & Western has let the 500 coal cars mentioned last week to the Lafayette Car Works. The second 500 may be let in a month or two.

The Jacksonville Southeastern Line is having built by the Mount Vernon Car Mfg. Co., of Mt. Vernon, Ill., 250 box cars fitted with air brakes and 250 coal cars, both of 60 000 lbs. capacity. The company will be in the market shortly for new box cars; the number has not been definitely decided.

The Cincinnati, Wabash & Michigan this week awarded a contract for new passenger cars with one of the shops at Wilmington, Del. The Terre Haute Car & Mfg. Co. is building 100 platform cars for the road.

The Dunkirk, Allegheny Valley & Pittsburgh road has recently ordered a number of freight cars and a few locomotives.

The Pullman Car Co. has delivered 19 of the 50 standard gauge passenger cars ordered by the Denver & Rio Grande some time ago. Four first-class and six second-class cars were received this week.

The Maine Central is building 75 box cars and 150 platform cars at its Waterville shops.

The Lafayette Car Works are building 200 box and the Missouri Car & Foundry Co. 150 stock cars for the Pennsylvania Southwest system.

A new private car is being built at the Wagner car shops at Buffalo, N. Y., for the President of the Buffalo, Rochester & Pittsburgh. It will be completed the last of November.

The Minnesota Iron Car Co. is working on an order for 1,000 cars for the Iron Car Equipment Co. and 500 platform cars.

Five hundred box cars are being built for the Toledo & Ohio Central road.

The Wason Mfg. Co., of Springfield, Mass., will ship a number of new passenger cars, in detached parts, to Chile in about two weeks. The company is unusually busy just now, the machine shops being put upon extra evening time several days ago. An order has recently been received for over 20 passenger cars for the Old Colony road, and there is a good demand for electric cars from the larger Western cities. Ten elevated road cars were shipped to New York last week. Electric lights are being introduced throughout the Wason shops.

About 1,100 hands are said to be employed at the Buffalo shops of the Wagner Car Co. at present, and there is work enough ahead to keep the works employed to full capacity for a year. Twenty new cars are now in process of building in the erecting shops. From six to eight new cars a month are being built at the shops, in addition to repairs on an average of from 50 to 60.

BRIDGE BUILDING.

Alexandria, La.—E. L. Abott, Assistant Engineer of the Union Bridge Co., is supervising the building of the foundations for the bridges to be erected over the Red, Ouachita and Little River, near Alexandria.

The Queen City Bridge & Steam Forging Co., of Cincinnati, O., has received the contract for building two small iron bridges near Alexandria.

Amesbury, Mass.—The county commissioners opened nine bids for building the bridge across the Pow Wow River. The contract for the iron work was awarded to the Boston Bridge Works at $7,487; for the stone work to Joseph Ross, of Ipswich, Mass., at $11,900, who was also awarded the contract for the foot bridge at $1,265.

Bath, Me.—The following proposals for a small iron bridge were opened by the Town Clerk: Wrought Iron Bridge Co., Canton, O., $1,995; Pittsburgh Bridge Co., Pittsburgh, Pa., $2,011.

Bayside, N. Y.—The Long Island Railroad has begun the construction of an iron bridge across the creek on the meadows between Bayside and Douglaston, Long Island, N. Y.

Cincinnati, Ohio.—Cincinnati newspapers give currency to a report that the Pennsylvania officers have made a recommendation to change the Cincinnati & Newport Bridge over the Ohio River to permit of the laying of a second track. This would necessitate a widening of the present piers and a reconstruction of the superstructure.

Cleburne, Tex.—It is proposed to erect a new bridge across West Buffalo, the expense to be defrayed by city, private and county subscriptions. The cost would be about $2,000.

Columbus, O.—Proposals are wanted until Nov. 17 for the construction of a viaduct at Columbus, by the County Auditor.

Elizabeth, N. J.—The committee on the Banta bridge at Roselle recommends that the present structure be replaced by a new iron beam bridge, not to exceed in cost $1,050, and the recommendation has been adopted by the supervisors.

Elizabeth, Pa.—The Elizabeth Borough Council has granted an ordinance to the Elizabeth & West Elizabeth Bridge Co., giving the right to construct an approach to the proposed bridge over the Monongahela River. The Bridge will cost $90,000 and will be completed by July 1, 1891. B. L. Wood and W. B. Wood and W. C. and A. Jutte, of Pittsburgh, are directors.

Hackettstown, N. J.—The contract to erect a low truss iron bridge over the Musconetcong Creek at Point Mills, between Warren and Hunterdon Counties, has been awarded by the joint committee to the Smith Bridge Co., of Toledo, O. The price is $1,325. The bridge is to have a 71 ft. span between abutments and a roadway 16 ft. in the clear.

Hamilton County, O.—Sealed proposals will be received by the Board of County Commissioners until Nov. 22, at 12 o'clock M., for the following county work: Wrought-iron bridge across the Sycamore Creek, on the Loveland and Maderia road, Symmes township; wrought-iron truss bridge on the West Fork road at Bachelors, Millcreek township; wrought iron truss bridge on West Fork road at Hahn's, Millcreek township. The work to be done according to plans and specifications on file in the office of the commissioners. The commissioners will also receive bids on the same date for the approach to the east end of the suspension bridge across Whitewater River, at Calloway Ford, Whitewater township.

Hartland, Me.—E. J. Smith, S. M. Davis, and A. Welber are members of the bridge committee which has in charge the erection of an iron bridge at Hartland.

Lancaster, Pa.—Specifications are being prepared for a bridge over the Conestoga River at Reigart's Landing, by order of the street committee.

Lincoln, Neb.—The Missouri Pacific, Fremont, Elkhorn & Missouri Valley, and Burlington & Missouri River roads have submitted a proposition to the city council to construct two wooden viaducts at a combined cost of $30,000, the city to contribute $5,000 thereof, to pay all damages to abutting property, and to maintain the structures.

Martinsville, Ind.—The second bridge over White River, near Martinsville, on the Indianapolis and Vincennes road, was completed last week. One was built in the early part of the season east of the town, the other is located west of it, the road crossing the river twice within a few miles. Each structure is built of iron and is 280 ft. long.

Minneapolis, Minn.—The contract for the new bridge of the Minneapolis, St. Paul & Sault Ste. Marie, in Minneapolis, has been let to Henry & Balch, of Minneapolis.

The Shiffler Bridge Co., of Pittsburgh, has been awarded the contract for a 1,700-ft. bridge over the Mississippi River at Minneapolis. The bridge consists of four spans over the river, and a viaduct approach by land.

Monticello, Ill.—The St. Louis Bridge & Iron Co. has a contract to erect a 320-ft. bridge at Monticello, Ill.

Oakland, Cal.—L. J. Geleonte, Assistant Engineer, is working up the plans for a steel and iron drawbridge across Park street in this town.

Orange Grove, Md.—Residents of Baltimore and Howard Counties are engaged in raising subscriptions for a new bridge which it is proposed to erect over the Patapso River at this place. It will cost about $20,000. Among those interested are John Glenn and E. C. Norris of Frederick.

Philadelphia.—The contracts for building the east and west approaches to the Walnut street bridge were let recently by the Director of Public Works. The Pencoyd Iron Works of A. & P. Roberts & Co. were awarded the contract for the east approach for $55,263, and the Edgemoor Bridge Works the west approach for $58,885. The latter firm intended its bid for the east approach, as the west approach could not possibly be constructed for less than $100,000 more than the company contracted for. The average of the bids for that work was $230,000. It is said that the company will forfeit its contract. The bid of A. & P. Roberts for the west approach was $208,698, and of the Keystone Bridge Co. $275,400.

The park commissioners of Philadelphia have received plans for a new iron bridge over Lansdowne ravine. The new structure is to cost $50,000, and will replace the present wooden bridge.

Roanoke, Va.—The committee on bridges, appointed by the city council, will receive bids until Nov. 14, for the erection of the approaches of Randolph, Henry and Park street bridges. A bid may be made for the entire work, or separately for the masonry, filling or iron work.

Rothville, Mo.—Proposals are wanted until Nov. 5 for the erection of a bridge over Yellow Creek by John A. Lee, Clerk of the Chariton County Court.

St. George, S. I.—The supervisors have ordered a survey made for a bridge at the Fresh Kill, on the county road between Northfield and Westfield, Staten Island, N. Y.

St. Paul, Minn.—The Board of Public Works has awarded the contract for the superstructure of the Sixth street bridge to the Chicago Forge & Bolt Co. at $128,875.

Scranton, Pa.—The City Engineer has been directed to prepare plans, specifications and an estimate of cost for an iron bridge on Hollow street, crossing Beach Creek.

Tavares, Fla.—The King Iron Bridge & Mfg. Co., of Cincinnati, O., has been awarded the contract, at $3,800, to build a bridge across Dead River, at Tavares.

Topeka, Kan.—It is proposed to build a suspension bridge across the Kansas River on Quincy strees, Topeka, at a cost of $65,000. The proposition is to be submitted to the voters of Shawnee County at the general election on Nov. 4. The specifications for the new bridge provide as follows: The foundations to consist of piles with cement concrete. The foundations above extreme low water to be steel cylidders filled with concrete. The suspension towers to be of steel plates strongly riveted into cylinders, having a spreading base and filled with Portland cement concrete. The bridge consists of two spans of 470 ft. each from centre to centre of piers. The roadway to be 20 ft. wide, and the sidewalks to be six ft. wide from centre of cable to outside of walk. The towers are 60 ft. high above the roadway. There is 24 ft. in the clear above low water at the side towers and 32 ft. in the clear at the centre tower. There are two main cables containing 1,500 No. 9 steel wires each, reaching

from anchorage to anchorage. There are four auxiliary cables containing 200 No. 9 steel wires each. The floor system consists of cross timbers, 3 × 14 in., placed 18 in. apart under the roadway and 3 ft. apart under the sidewalks.

West Bay City, Mich.—Plans have been prepared and forwarded to the Board of Public Works for the proposed bridge to be erected over the Michigan Central tracks, at Washington street, this city, the estimated cost of which is over $50,000.

Whitehall, N. Y.—The Delaware & Hudson Canal Co. has recently awarded a contract to the Rochester Bridge Works to build the iron bridges for the last 16 miles of its second track to Whitehall.

Willimansett, Mass.—Sealed proposals will be received until 10 o'clock a. m., Nov. 19, for the masonry and foundations for the bridge over the Connecticut River at Willimansett between Holyoke and Chicopee. Proposals should be addressed to Leonard Clark, Chairman, Springfield, Mass. Copies of the plans and specifications will be mailed upon application to Edwin S. Shaw, Consulting Engineer, 146 Franklin street, Boston, Mass. Copies may be seen at the office of the County Clerk, Springfield, Mass. The masonry consists of six piers and two abutments and about 700 lineal feet of wing walls and retaining walls. The river piers will be about 37 ft. high from the top of the foundation crib. The foundations for the river piers will be cribs 15 ft. × 57 ft. × 3 ft., the bottom to be 2 to 3 ft. below the below the bed of the river. They may be sunk by coffer dams or by caissons. The foundations are to be rip-rapped.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Maine, $5 00 per share, payable Nov. 15.
Concord & Montreal, 3 per cent., payable Nov. 1.
Seaboard & Roanoke, $3.50 per share, payable Nov. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 3.
Baltimore & Ohio, annual, Baltimore, Md., Nov. 17.
Boston & Maine, annual, Boston, Mass., Dec. 6.
Boston, Revere Beach & Lynn, annual, Boston, Mass., Nov. 20.
Boston, Winthrop & Shore, annual, Boston, Mass., Nov. 20.
Buffalo, Rochester & Pittsburgh, annual, 36 Wall street, New York City, Nov. 17.
East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 19, and special, Knoxville, Tenn., Dec. 6.
Knoxville Belt, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
Knoxville, Cumberland Gap & Louisville, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
Knoxville Southern, special, 126 Gay street, Knoxville, Tenn., Nov. 1.
Manhattan (Elevated), annual, 71 Broadway, New York City, Nov. 12.
Milwaukee & Northern, special, Milwaukee, Wis., Nov. 12.
New Orleans & Northeastern, annual, New Orleans, La., Nov. 5.
New York, Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 25.
New York & Northern, annual, 32 Nassau street, New York City, Nov. 12.
Utah Midland, annual, Salt Lake City, Utah Ter., Nov. 3.
Wabash, special, St. Louis, Mo., Nov. 25.
Wisconsin Central, annual, Milwaukee, Wis., Nov. 5.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month. at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m , on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p.m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Mechanical Engineers.

A meeting of this society will be held in Richmond, Va., Nov. 11 to 14. The sessions will be held in the Hall of the Exchange Hotel, and the headquarters and Secretary's office will be in the same hotel. There will be a reception to the society by the Governor of Virginia, and excursions to points of historical interest, to the industrial works in that region, to the Newport News shipbuilding yard and to the Portsmouth navy yard, where the battle-ship Texas and the cruisers will be inspected. Among the papers of interest are the following: "Light Cable Road Construction," by Frank Van Vleck; "Authorities on the Steam Jacket—Facts and Current Opinions," by R. H. Thurston.

Professional papers as follows: "Some Properties of Ammonia," by De Volson Wood; "Mechanical and Physical Properties of Sulphur Dioxide (SO_2)," by De Volson Wood; "Theoretical Investigation of Efficiency of Vapor Engines," by De Volson Wood; "Hydraulic Hoisting Plant for the Pier of Brooklyn Sugar Refining Co.," by Louis G. Engel; "Hydraulic Traveling Cranes," by Erwin Graves; "Rope Driving," by C. W. Hunt; "Accident-Preventing Devices for Machines," by John H. Cooper; "An Interesting Experiment with a Lubricant," by Geo. W. Bissell; "Some Novel Experiments with a Lubricant," by Jas. E. Denton.

Among the topical questions are: What limits are there to the speeds of a hot-air or caloric engine? How many times per minute can a dash-pot apparatus be lifted, such as is used with Corliss' valve gear? Which is better economy in a foundry cupola—to melt rapidly, producing a relatively cool iron, or to melt more slowly, producing hotter iron? Have you had any experience in outdoor work at night, in wind and storm, with portable apparatus for light in large quantities, other than electric light? What is the best design for line shafting, transmitting over 50 horse power, permitting them to be stopped and started on any floor, without interfering with the motor or other shafting? What is the best form of cylinder lubricator for engines carrying 140 lbs. of steam pressure or over? What are the maximum safe speeds for hoisting and reversing in an overhead traveling crane in a machine shop?

Special rates are secured for members and their friends on the certificate plan. If enough passengers can be secured to go in one party a special car or cars will be provided from New York.

The Canadian Society of Civil Engineers.

The discussion on the subject of the paper "Developments in Telegraphy," read by Mr. Kelly, Assistant Chief of the Dominion Government Telegraph System, was resumed at the meeting of the Canadian Society of Civil Engineers at Montreal last week. A number of prominent telegraphers, resident in different parts of the Dominion, had communicated criticisms on the new system of telegraphy introduced in the paper, and these were replied to by the author. The discussion was favorable to the new multiplex, and Mr. W. J. Camp, the electrician of the Canadian Pacific telegraphs, spoke of the quadruplex and other multiple systems in operation under his supervision, and expressed a favorable view of the practicability and usefulness of the way line system proposed.

Engineers' Society of Western Pennsylvania.

The society held its regular monthly meeting on the evening of Oct. 21 in its new rooms in the Academy of Science and Art, 5th street. A paper was read by Prof. J. W. Langley on "European Bessemer Practice in Small Converters," which the author illustrated by drawings on the blackboard. The meeting was well attended and general satisfaction expressed at the arrangements of the new quarters.

PERSONALS.

—Mr. Alden S. Cooke, who has been General Master Mechanic of the Chicago & Eastern Illinois for the last 13 years, has resigned.

—Mr. Bernard H. Schmidt, the Western Selling Agent of J. G. Brill & Co., of Philadelphia, has resigned, and is not now connected with the company.

—Mr. E. C. Winstanley has resigned his position as Superintendent of the Shawnee & Muskingum River division of the Columbus, Shawnee & Hocking.

—Mr. Wm. Porter, of Brooklyn, N. Y., has been appointed General Manager of the Chester Foundry & Machine Co., of Chester, Pa., vice Mr. Albert E. Jenkins, resigned.

—Mr. E. K. Turner, for many years the Chief Engineer of the Fitchburg road, retires from that position Nov. 1, and for the balance of the year will serve as Consulting Engineer.

—Mr. H. W. Reighley, Purchasing Agent of the Milwaukee, Lake Shore & Western, has resigned the position, and will remove to New York, where he proposes to engage in other business.

—Mr. Edward Cooper, of New York, and Mr. James Herdman, of Ohio, two Assistant Engineers employed by the New York, New Haven & Hartford on the double-tracking of the Shore Line, were killed by being thrown off the drawbridge at East Lynne, Conn., by an east bound train, last Tuesday. Mr. Cooper was a graduate of the engineering department of Cornell University, and had been employed in the Park Department of New York City for several years.

—The resignation of Mr. D. B. McCoy, Division Superintendent of the West Shore, and the transfer of Mr. J. P. Bradfield to the Buffalo division left a vacancy on the Hudson River division which has been filled by the promotion of Mr. W. G. Wattson, who has been Car Accountant for some years. Mr. Wattson is quite widely known through his services in promoting car service reform, as a member of the Car Service Association and in the General Time Convention, and he has been a valued contributor to the *Railroad Gazette*.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—The following directors were elected at the annual meeting of the stockholders at Birmingham, Ala., Oct. 22: Henry D. Browne, Agustus B. Abraham, Roger Eykyn, Charles Schiff, Thomas W. Snaggs, Samuel Thomas, Calvin Brice, John H. Inman, John S. Moore, Charles McGhee and Francis Pavey. The board was increased from seven to eleven.

Augusta & Chattanooga.—W. E. Baskette, of Chattanooga, Tenn., has been elected President, and W. B. Young, of Augusta, Secretary of this new road.

Chicago & Erie.—F. M. Caldwell, for some time Passenger Agent of the New York, Lake Erie & Western at Detroit, Mich., has been appointed Division Passenger Agent of this company, with headquarters at Huntington, Ind.

Chicago, St. Paul & Kansas City.—M. C. Woodruff, Secretary of the company, will assume the duties of General Claim Agent, with office at Dubuque, Ia., G. C. McMichael having resigned that position to accept the general management of the Eureka Car Coupling Co., of Minneapolis, Minn.

Cleveland, Cincinnati, Chicago & St. Louis.—A meeting of stockholders of the company was held in Cincinnati Oct. 29 for the election of five directors. The following were re-elected: George Bliss, J. D. Layng, William H. Anderson, H. McK. Twombly and S. J. Broadwell.

Columbus, Shawnee & Hocking.—At the annual meeting of the stockholders held at Columbus, O., Oct. 20, the number of directors was increased to 11, and the following Board elected: D. S. Gray, P. W. Huntington, H. D. Turney, C. C. Hoover, Charles Parrott, W. E. Guerin, Samuel Huston and F. J. Pickard, Columbus; Charles Andrews and E. C. Winstanley, Zanesville: and D. B. Hatch, New York. The Board elected D. S. Gray, President; F. J. Pickard, Vice-President; H. D. Turney, Treasurer; and W. E. Guerin, Secretary.

Delaware & Otsego.—A meeting of the directors was held recently, and the following officers were elected: Samuel W. Andrews, of New York, President, Samuel G. Dimmick, Vice-President and Secretary, and R. B. Jones, Treasurer.

Georges Valley.—The former directors of the company were re-elected at the recent stockholders' meeting, with the exception of Joel Hill, of Warren, who succeeds Hon. F. A. Alden, of Union.

Harvey & Salisbury.—C. H. Harman, Jefferson M. Levy, Dallas Flannagan and Robert B. Harrison, of New York, were elected directors of this Nova Scotia road last week. The Board elected C. H. Harman President and Jefferson M. Levy Vice-President.

Louisville & Nashville.—E. H. Burch, formerly Traveling Freight Agent of the company, with headquarters at Louisville, has been appointed Assistant Superintendent of Terminals.

Mexican Gulf, Pacific & Puget Sound.—Charles Seymour, of Madisonville, Ky., has accepted the position of Chief Engineer of this new company.

Mexican International.—Adam Hoffman, formerly commercial agent, has been appointed Assistant General Freight and Passenger Agent, with office in the City of Mexico.

Milwaukee, Lake Shore & Western.—H. W. Reighley having resigned the office of Purchasing Agent the duties of that office will be performed by the General Manager for the present.

Minneapolis & St. Louis.—The annual meeting of officers resulted in the election of W. H. Truesdale as President and Joseph Gaskell as Secretary and Treasurer of the road. A. E. Clarke succeeds J. D. Springer as Vice-President.

Missouri Pacific.—Arthur W. Street, Commercial Agent at Kansas City, has been appointed Assistant General Freight Agent of the system, the appointment to take effect Nov. 1.

A. W. Zimmerman has been appointed General Foreman of the bridge and building department of the company's lines in Kansas, vice H. C. Gibson, resigned. His headquarters will be at Osawatomie, Kan.

Northern Pacific.—William Jones has been appointed Roadmaster of the Cascade division, with headquarters at Puyallup. He will also have charge of the track from Puyallup to Seattle and all the small branch lines. L. W. Jenney has been appointed Roadmaster in charge of the division from Puyallup to Tacoma, which includes the terminals in Tacoma. Mr. Jenney was formerly Roadmaster of the whole division. T. Hanrahan, who was formerly Assistant Roadmaster, has been appointed Roadmaster of the division from Lake View to Portland.

Oneida, Oneonta & New York.—At the annual meeting of the stockholders of the company, held in Oneonta, N. Y., last week, the following directors were chosen for the ensuing year: J. W. Warner, R. B. Downing, E. E. Coon, J. F. Tuttle, of Oneida; M. F. Smith, of Knoxborough; G. B. Kimball, of New Berlin; J. P. Kenyon, John A. Ward, of Morris; M. L. Keves, A. C. Lewis, A. Morris, W. A. E. Tompkins, of Oneonta; L. S. Mott, of New York. Officers were elected as follows: J. W. Warner, President; D. P. Wilber, Treasurer, and W. A. E. Tompkins, Secretary.

Penobscot Shore Line.—William B. Ludwig, of Waldoboro, has resigned the position of Roadmaster and is succeeded by George Nevens, of Brunswick, who occupies a similar position on the Maine Central.

Philadelphia & Reading.—Austin Corbin has resigned the presidencies of the Mount Carbon & Port Carbon road, the Schuylkill Valley Navigation & Railroad Co., and the Mill Creek & Mine Hill Navigation & Railroad Co. All of these roads are leased by the Philadelphia & Reading. A. A. McLeod has been chosen President of the three companies.

Albert Foster, formerly First Register, has been appointed Purchasing Agent; John Walker, Jr., formerly Second Register, appointed Transfer Clerk; Charles H. Quarles, formerly Assistant Secretary, appointed Auditor of Passenger Traffic. The offices of the First Register, Second Register and Assistant Secretary, have been abolished.

Pittsburgh Junction Terminal Co.—At the annual meeting of the company recently held, the old Board of Directors was re-elected as follows: William Metcalf, Campbell B. Herron, Thomas M. King, Reuben Miller, Alex. Bradley, Charles L. Fitzhugh and J. Painter, Jr.

William Metcalf was re-elected President, and J. B. Washington, Secretary and Treasurer.

Pittsburgh & Lake Erie.—I. A. McCormick has been appointed Train Master, with headquarters at Chartiers, Pa., vice Chas. Dietrick, resigned.

Richmond & Danville.—J. A. Davenport has been appointed Engineer of Maintenance of Way for the portion of the Georgia Pacific Division between Atlanta, Ga., and Birmingham, Ala., with office at Birmingham, Ala., and as such will have charge of bridges and trestles and all forces in the maintenance of way department.

St. Paul & Duluth.—Leverett S. Miller has been appointed Chief Engineer of the road with headquarters in St. Paul, Minn.

San Angelo, Abilene & Henrietta.—At a meeting held at Abilene, Tex., Oct. 20, to organize this road, the following directors and officers were elected: W. B. Wortham, C. W. Easley, A. D. Goodenough, Henrietta, Tex.; H. E. East, Archie County; W. D. Reynolds, Throckmorton; John Boyer, P. M. Devitt, E. S. Hughes, Abilene; J. W. Hill, D. M. Devitt, J. G. Murphy, San Angelo, Tex. Officers: E. H. East, President; John Bowyer, Vice-President; D. M. Devitt, Secretary and Treasurer, and A. D. Goodenough, General Manager.

Savannah, Americus & Montgomery.—Carroll H. Smith has been appointed General Eastern Agent of the road, with headquarters in New York City.

South Brooklyn Railroad & Terminal Co.—At the annual election John W. Ambrose, W. Bayard Cutting, Joseph Richardson, Edward T. Hunt, A. L. Dennis, F. K. Hain and Clarence Stephens were chosen directors. The directors elected the following officers: John W. Ambrose, President; Joseph Richardson, Vice-President; W. Bayard Cutting, Treasurer, and Francis H. Bergen, Secretary.

Terminal City.—The officers are: William D. Lewis, President; H. M. Pearl, General Manager; William H. Allen, Treasurer, and Frederic R. Page, Chief Engineer. The office is at 31 Milk street, Boston.

Union Pacific.—S. M. Adsit has been appointed General Freight Agent of the St. Joseph division, to succeed W. P. Robinson, Jr., who was recently appointed General Manager of that section.

Virginia & Kentucky.—A company has been organized to build this road with the following officers: Gen. James A. Walker, President; W. N. Ruffin, of Danville, Va., Vice-President, and C. E. Northern, Jr., of Richmond, General Manager. The following are directors: J. A. Walker, W. N. Ruffin, J. C. Green, C. G. Holland, Harmon Newberry, Wm. Mahone, A. Gerst, C. H. Conrad, C. A. Nash, Henry C. Stuart, Wm. Watkins, T. M. R. Talcott and George W. Gillespie.

West Shore.—J. P. Bradfield, Division Superintendent, has been transferred to the Buffalo Division to succeed D. B. McCoy, who leaves the service to accept a position on another railroad. W. G. Wattson has been appointed Division Superintendent, in charge of the Hudson River Division, with office at Weehawken, N. J. G. P. Conard has been appointed Car Accountant, vice W. G. Wattson, promoted.

J. A. McCormick, Trainmaster of the eastern end of the Western division, has resigned to accept the Superintendency of a Pennsylvania road. He will be succeeded by William K. McCoy, a son of D. B. McCoy, formerly Division Superintendent.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Burlington & Missouri River.—A corps of surveyors is reported to be surveying a route from Pueblo, Col., to Goodland, Kan., and it is stated that the construction will begin this winter. The survey has been made from Pueblo down the Arkansas River to Rocky Ford, thence to Kit Carson. It will then probably run to Oberlin and Goodland.

Canadian Pacific.—The Pembina Mountain branch of this road is to be extended from the present terminus at Deloraine, Man., through the Souris coal fields to Regina to connect with the main line and the Qu'Appelle, Long Lake and Saskatchewan to Saskatoon and Prince Albert.

Cape Breton.—This road was formally opened last week by the Governor General of Canada. The road extends from Point Tupper, on the Cape Breton shore of the Strait of Canso, to Sydney and North Sydney. It is 98 miles in length. The bridge over the Grand Narrows is being built by Isbester & Reid. It is a steel structure of six spans of 242 ft. each, and a swing over all of 245 ft., giving an aggregate length of 1,697 ft. The piers and abutments are of masonry. The depth of water for 1,200 ft. in the line of the bridge is 75 ft. Isbester & Reid were the contractors for the construction of the western section, Point Tupper to Grand Narrows, and Sims & Slater for the construction of the eastern section, Grand Narrows to Sydney and North Sydney. Long wharves have been built at Point Tupper and Sydney. The stations on the line are Port Hawkesbury, Old Mines Road, McIntyre Lake, Orangedale, McKinnon's Interval, Grand Narrows, Grand Narrows North, Grand Narrows South, Christmas Island, Scrace Cove, Shunacadia, Boyesdale, Georges River, North Sydney Junction and North Sydney. Trains will be ferried across the Straits of Canso between Hawkesbury and Mulgrave, a distance of one mile.

Charleston, Wilmington & Norfolk.—It is reported that grading will be commenced shortly. The line is to be constructed between Norfolk and Charleston, S. C. The route has been surveyed the entire distance, and rights of way have been obtained through much of the country to be traversed.

Chicago & Akron Junction.—The contractors have a very large force working between Chicago Junction and Warwick, O., 60 miles. The grading between these points is about four-fifths done. There are six iron bridges, and the masonry work has been begun on all of them, and is about three quarters finished. The length of the bridge spans varies from 60 ft. to 100 ft. These are the only important bridges on the line. The maximum grade is 26 ft. per mile, and the maximum curvature is 2½ degrees. The tracklaying and ballasting has commenced at three points—Chicago Junction, Greenwich and Lodi. The route is from Chicago Junction to Akron, and passes through Greenwich, Sullivan and Troy, or Nova, Homer, Lodi, Creston, Sterling, Rittman and Easton, Warwick, Clinton and New Portage, a distance of 75 miles. The line is permanently located and contracts let to Ryan & McDonald, of Baltimore.

Chicago & Eastern Illinois.—A Chicago dispatch says that arrangements are being made by this company for the construction of a connecting link between its road and the Indianapolis & St. Louis, which, when completed, will form another line between Chicago and St. Louis.

Chicago, St. Paul & Kansas City.—The extension of this road from St. Joseph to Kansas City will be completed in less than a month, and a 100-mile extension into Omaha from a point below Des Moines will be undertaken next year. The latter will give the road a shorter route for through Western business.

Delaware & Hudson Canal Co.—The track of this company's branch to Stillwater, N. Y., constituting a part of the Mechanicsville & Ft. Edward road, has been taken up, and the branch will be entirely abandoned. The double tracking in progress from Saratoga to Whitehall, N. Y., 29 miles, is progressing quite satisfactorily. It is now nearly finished to Ft. Edward and being pushed north of the latter point to Whitehall. The first 11 miles north of Saratoga was graded by the company, the next six miles to Ft. Edward by E. Sweet, his contract including 10 spans of iron bridge across the Hudson River. From Ft. Edward to Smith's Basin, five miles, the grading is under contract to Jacob Holler, of Albany, and from Smith's Basin to Whitehall, 16 miles, the contracts have just been let to Drake & Stratton, of 71 Broadway, New York. The iron bridge work to be done by the Rochester Bridge Co. The entire work will be done by May 1, 1891.

Georgia, Tennessee & Illinois.—The Georgia-Alabama Development & Investment Co., lately organized, has undertaken the construction of this road, and will doubtless soon let the contract for the grading. The location is through a mountainous country, and it will be a difficult and costly line to build. The surveys were begun early in the year, and it is expected that the preliminary survey will be finished this week or soon after Nov. 1. The ruling grade is 66 ft. per mile and the maximum curve is eight degrees. The surveys cross all the water courses between Lookout Mountain and Sand Mountain, this being the first road to cross Lookout Mountain. Some portions of the road are of light grade, however, but they are few. The survey is from Tallapoosa, Ga., through Oak Level, Ala., Rowell's Station, Bluffton, Langdon, Rock Run Station, Rock Run, Center, Round Mountain, Loveless, Ft. Payne, Ider, Fabins and Stevenson, Ala. The length of this route is 125 miles. The Tallapoosa River bridge will contain one 100-ft. span. That over Terrapin Creek will have six spans from 40 ft. to 130 ft. in length. Other bridges will be 60-ft. span over Cowan's Creek: 250-ft. draw over Coosa River; 1,350 ft. bridge with draw span over Tennessee River, three short trestles of over 100 ft. maximum height, and perhaps two short tunnels. The principal freight will be the local traffic in iron and ores. L. F. Bellinger, of Tallapoosa, is Chief Engineer.

Harriman Belt Line.—This road surrounds the town of Harriman, Tenn., and is built under the charter of the Harriman Railway & Construction Co. At present about three miles of track and sidings is being operated. The grading is being done by Funk & Ryan, of Springfield, O. The company does the tracklaying. The work is all pretty light. Maximum grade is 1.25 per cent. and maximum curve 14 degrees. There is in progress some 50 miles of surveys for branches to coal and iron fields.

Huron & Ontario.—The transfer of this company's charter, recently made to M. G. Cameron, of Toronto, Ont., has little significance, and is not likely to affect the probability of the construction of the road either adversely or favorably. Mr. Cameron is a member of the law firm of Ross, Cameron & McAndrew. The road is chartered to extend from the town of Goderich, in Huron County, through the villages of Blyth and Brussels, and through Listowel, in Perth County, to Hamilton, or to some intermediate point on a line of railroad running through either of the counties of Waterloo, Wellington, Wentworth and Halton to Hamilton. The distance is about 110 miles. No surveying has as yet been made as it is hard to say what the prospects for building are. The officers of the Canadian Pacific have repeatedly stated that they would construct a road along a similar route from Guelph to Goderich. It is believed that this is still their intention. If that line is built the Huron & Ontario project will be dropped.

Illinois Central.—It is reported in several of the Chicago papers that this company is to build another suburban road on the South side of the city to start from the main line at Ninety-ninth street and Cottage Grove avenue, and extend west to Halsted street, and then south to Fernwood and Washington Heights, crossing the Rock Island, and to One Hundred and Twenty-third street, thence east to a connection with the main line again at Gardner station.

Johnson City & Carolina.—The tracklaying will commence about Nov. 1 on this road, which is being built in East Tennessee. Purdy & Rexford, of New York, who were awarded the contract for grading in April, 1890, have that work about four-fifths completed. Their present address is Jonesboro, Tenn. The road is a branch of the East Tennessee, Virginia & Georgia, and is being built from Johnson City to Embreeville, Tenn. The maximum grade is 60 ft. per mile and the maximum curve is four degrees. There is one bridge 200 ft. long.

Kentucky Union.—The company expects to have the road completed to Inverness, Ky., 15 miles from Lexington, before the end of the year. The track has been laid, except on the eight miles nearest to Inverness, which has been graded. About 52 miles of track has been laid on this road since last January. Mason, Hoge & Myer, of Louisville, are the contractors. The extension to Big Stone Gap has not yet been located, and it is not known when the survey will be made.

Louisville, New Albany & Chicago.—The stockholders of the company held a special meeting in New York on Oct. 29, at which 30,946 shares of stock of the 50,000 shares were represented, and the Directors were authorized to build two important extensions of the road and to establish additional terminal facilities in Indianapolis. The Directors were given entire power to provide the means to pay for these improvements. The extensions will consist of a line of road 30 miles long into the coal fields of Clay County, Ind., and a line 80 miles long, connecting the Orleans, West Baden & French Lick Branch with Evansville, Ind. At the last-named place the new branch will connect with the Louisville & Nashville to Southern points and St. Louis, and also with the Ohio Valley route. Since last spring much has been done to improve the property. The Directors have made a careful inspection of the 553 miles of road under operation. The company has purchased 500 new cars, 15 new locomotives, and other equipment. All of the bridges have been rebuilt or repaired and 6,000 tons of new rails have been bought and will be laid soon.

Milwaukee, Lake Shore & Western.—It was recently reported that the company had decided to build a line from interior Michigan to a connection with the Duluth, South Shore & Atlantic and the name of a firm of contractors was given as those to whom the work was awarded. The officers deny that such a line has been put under contract, nor is it proposed to build it at all.

Montreal & Pacific Junction.—Application will be made at the approaching session of the Quebec legislature for an act of incorporation by this company to build a road from the Canadian Pacific line at Hochelaga, Que., to connect with the North Shore Railroad, in the county of l'Assomption. The capital stock is $500,000.

New Albany Belt & Terminal.—The work of construction on this road is now in active progress and the entire line is expected to be completed next month. All the grading and masonry has been finished; one and a half miles of track has been laid and the remainder will be completed as soon as the iron trestle is erected. The iron work is being done by the Schiffler Bridge Co., of Pittsburgh. The road is being built for the purpose of connecting the Kentucky & Indiana Bridge with all the manufacturing establishments in New Albany, Ind., and with the Louisville, Evansville & St. Louis. It will be three miles in length, about two miles of the distance being along the river front. It passes the New Albany wharf on an elevated iron trestle with spans from 30 ft. to 78 ft. in length; the total length of trestle is 1,400 ft. The officers are J. F. Gebhart, of New Albany, President, and John MacLeod, of Louisville, Chief Engineer.

New Roads.—The State of Chihuaho, Mexico, through Gov. Carrillo, is advertising for bids for a narrow gauge road from the city of Chihuahua to Guaymas, on the Pacific coast. At Guaymas this branch line will connect with the Sonora road.

The survey of the new line from Athens to Harriman, Tenn., on the Cincinnati Southern, is about completed, and the engineers will in a few days commence the line from here to Hiwassee Gap on the Knoxville Southern.

Tenders are asked by the New Glasgow Iron, Coal & Railway Co. for the building of about one mile of railroad to connect the Intercolonial line with the site of the proposed smelting works at Eureka, East River.

Application will be made at the coming session of the Quebec legislature for the incorporation of a company to build a road from a point on the Quebec & Lake St. Francis to the village of Plessisville, County of Megantic. Incorporation will also be asked for a company to construct a line from a point in Missisquoi County, on the Provincial frontier, or from the Richelieu River, opposite Lacolle, to some point on the Grand Trunk line, between St. Hilaire and St. Hyacinthe. The route will be through the counties of Missisquoi, Iberville, Rouville and St. Hyacinthe.

Northern Pacific.—The Burnett branch of the road has been extended 2.4 miles from Burnett station to Pittsburgh mine, Wash., and will be operated as a part of the Northern Pacific & Cascade road, under the jurisdiction of the superintendent of the Pacific Division.

Ontario & Rainy River.—Notice has been given that application will be made to Parliament for an act to legalize certain agreements between the company and the Port Arthur, Duluth & Western for running powers over the latter road; also to empower the company to build a branch from the eastern end of Basswood Lake to a point on the main line of the road; a branch from the southeast end of Kashabow Lake in a southwestern direction to the nearest point on the main line, and to build a railroad bridge across the Rainy River into Minnesota.

Tenders will be received up to Jan. 19 for the construction and equipment of this line from or near Sand Lake to the mouth of Rainy River; seventy miles to be finished by Dec. 31 next, and completed inside of three years from that date. Tenders may be for a sum per mile in cash, or may be part cash and balance in bonds and stock of the company.

Ottawa & Gatineau Valley.—This road has now reached a point about three miles beyond Ironsides, P. Que. By the end of this week 10 miles of track will be laid.

Pennsylvania.—Engineers are reported to be running a survey from Cape May, N. J., for a proposed line from New York along the beaches to Cape May, making a belt line between New York, the ocean towns and Philadelphia. The surveying was completed down the beaches as far as the Two-Mile Beach some time ago. The surveyors are now completing the lines.

Philadelphia & Reading.—The recent report that the Plymouth road would be double-tracked between Oreland and Conshohocken, Pa., was incorrect. The work is not to be done.

Port Townsend & Southern.—This line has been completed as far as Mud Bay, and the work at Olympia, Wash., will be discontinued. The grading and clearing between Hooker's Lake and Quilcene will be finished by the middle of November. Tracklaying will then commence, and trains will probably be running to Quilcene this year.

Puget Sound & Gray's Harbor.—This road will build a three-mile extention of a logging branch now built eight miles from the main line in the direction of Union City, Wash., on Hood's canal. The Port Townsend & Southern may buy the branch and build a line to connect with it from Union City. The distance will be about eight miles.

Qu'Appelle, Long Lake & Saskatchewan.—A survey has been made from Saskatoon, where the road crosses the South Saskatchewan River, to Battleford, and it is stated that the road will be constructed from Saskatoon to Battleford at an early date.

Richmond & Tidewater Coal & Railroad Co.—S. P. Clay & Co., of Richmond, Va., have the contract for grading this road and have the work about finished. The grading is all earth work and there are no difficulties in building the line. The grade is very level, with the exception of one mile, where the grade is 70 ft. to the mile. There is a maximum curve of five degrees on 500 ft. and of four degrees on 1,700 ft. Otherwise the line is straight. A trestle is being built which will be 1,200 ft. long and 16 ft. high. The road is to extend from a point on the Richmond & Danville, 14 miles from Richmond, to Tomahawk Church, a distance of five miles. Ultimately the line will be continued to Bermuda Hundred, 30 miles from the starting point, and several branches will be built. Surveys have been made from

the starting point to Tomahawk Church. F. C. Dinning, No. 1 Broadway, New York, is President.

San Diego, Phœnix & Galveston.—Articles of incorporation have been filed at San Diego, Cal., by this company, which proposes to build a standard gauge road from San Diego Bay to the eastern boundary of California at or near Yuma, Arizona. The capital is $1,900,000.

Seattle, Lake Shore & Eastern.—The company expects to make connection with the Fairhaven & Southern at Sedro, Wash., early next week. Only a few miles of road remains to be finished north of Lake McMurray to complete the work. The bridge over the Skagit has caused much delay. The line will be opened for traffic from Seattle to Sedro as soon as the track is laid to the latter town. A large part of the grading from Sedro to the international boundary has been done, and this work and the tracklaying will be pushed vigorously until the connection with the Canadian Pacific is made.

Southern Pacific.—The company has let a contract to Fitzgerald Bros., of Oakland, Cal., for the grading and tracklaying of 21 miles of road to be built from Avon, Contra Costa County, on the main line, to San Raman, Cal. The contractors were not required to give a bond, nor are they limited in the contract as to time. Ninety per cent. is paid monthly.

The company has signed the agreement presented by a committee of citizens from coast counties in California to complete the coast line of railroad from San Francisco to Los Angeles by closing the gap in the line between Santa Margarita and Ellwood, Cal. By the terms of the agreement the railroad is given a right of way through Santa Barbara and San Luis Obispo counties, and the line, it is estimated, will be completed in 17 months.

The work now going on in Cow Creek Cañon, Douglas County, Or., is a permanent reconstruction of about 3½ miles of railroad, rendered necessary by a landslide last winter, having permanently filled the valley with débris to a height considerably above the original roadbed. Bays & Jeffery, of Portland, Or., are the contractors for grading, tunneling and tunnel lining, and tracklaying. James Scobie, of San Francisco, Cal., is the contractor for masonry. The company's men erected the bridges and timber work. The work is heavy mountain cañon construction. There are two tunnels, one 415 ft. long and the other 433 ft. long. There is one iron through span (Phœnix) 180 ft.; three wooden spans 75 ft. clear each, and one trestle 80 ft. long and 20 ft. high. This is all the timber work except masonry open culvert floors. The maximum grade is 66 ft. per mile compensated. The maximum curve is 10 deg.

Terminal City.—This company is asking for tenders for the construction of about six miles of road from Mulgrave to Terminal City, N. S., on the strait of Canso. Plans and specifications can be seen at the office of the company, 31 Milk St., Boston, Mass., or at Terminal City. No tender will be considered unless made on a printed form to be obtained from the company.

Union Pacific.—A dispatch was sent out from Omaha this week to the effect that the work that has been going on for some time on a track extending north along the Missouri River through the land prepared by the East Omaha Land Co., for trackage purposes, is being done for the Union Pacific, and that it is to be extended to Sioux City, so that the road will have a track of its own when its traffic agreement with the St. Paul & Omaha expires.

Western Counties.—Rails are laid from Annapolis to Bear River, N. S., a distance of 14 miles, and the construction train is at work ballasting the road between the above places. There is a large amount of work yet to be done to the bridge across Bear River, and winter will set in before it is completed. The bridges across the Grand Joggins and Smith's Cove are finished. The whole roadbed from Bear River to Digby is now ready for the laying of rails.

Williamsport & North Branch.—A survey is being made for an extension of this narrow gauge road from Sonestown to Eaglesmere, Pa., about five miles. About $20,000 has subscribed along the route to aid the building of the extension, and if the remaining $10,000 of the amount which it is considered will be necessary for the construction of the line is secured, it will doubtless be completed before next June.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The directors of this company met in Boston Oct. 26 and formally approved the arrangement for the purchase of the Colorado Midland. The company makes the following announcement of the matter: "The directors have fully considered and approved the proposed acquisition of the Colorado Midland. The contract of purchase has been agreed to. The basis of the agreement is as follows: Colorado Midland stock is placed at a valuation of 50 and Atchison stock at 45. The Colorado Midland stock consists of 80,000 shares. This requires 88,889 shares of Atchison stock to issue to absorb the entire issue of the Colorado Midland. Two cash payments are provided for, as follows: Ten dollars for each share Colorado Midland stock at time of its deposit with trustee, and $10 per share at any time within one year. The Atchison issue of stock will be devoted to carrying out the contract for exchange of stock and to provide for the cash payments. The present capital stock of the Atchison company is $102,000,000. Of the Atchison stock required to complete the transaction, the Atchison Company already has 43,555 shares of its existing issues. The new issue of stock required consists of 45,500 shares, or $4,500,000, thus making the entire issue of capital stock of the Atchison Company, after the acquisition of the Colorado Midland is completed, $106,550,000."

Chicago, Burlington & Quincy.—The September statement of the road is as follows: Gross earnings, $3,244,467; increase, $63,790. Expenses and one-twelfth of annual charges, $2,679,868; increase, $185,084. Net earnings, $564,599; decrease, $121,293.

The Commissioner of the General Land Office in Washington has made a demand upon the company, as the successor to the Burlington & Missouri River road, in the matter of the adjustment of the land grant made by the act of July 2, 1864, for the reconveyance to the government of 201,101 acres of land alleged to have been patented to the Burlington & Missouri River Company in excess of the amount granted by the act referred to.

Illinois Central.—A statement has been issued for the three months ending Sept. 30 (the month of September estimated). The gross receipts during that period were $3,587,886, an increase of $15,585; the operating expenses and taxes were $2,608,118, an increase of $537,411 over the corresponding period last year. This large increase in the operating expenses is explained by the company as being chiefly due to extraordinary work in the road and machinery departments, which was under way but not completed at the end of the last fiscal year.

New York & New England.—The company's gross earnings for the year to Sept. 30 were $5,963,674, an increase of $400,266 over the same period last year; operating expenses, $3,911,629, an increase of $192,847; net earnings, $2,052,044, an increase of $207,419. The amount of fixed charges was $1,717,980, and the surplus for the year after paying these and also the dividend on the preferred stock is $149,332. Last year the surplus was only $22,940.

Oregon Pacific.—This company and the Willamette Valley & Coast road have been placed in the hands of a receiver on petition of the Farmers' Loan & Trust Co., of New York, representing the bondholders. T. E. Hogg, President of both companies, was appointed receiver.

Philadelphia & Reading.—The statement of the business of the railroad company for September, as compared with the same month of 1889, is given in the following table:

	1890.	1889.	Increase.
Earnings from traffic.			
Gross receipts	$1,932,712	$1,801,956	$130,756
Oper. expenses	1,000,606	916,192	84,414
Profit in operating	$932,106	$885,764	$46,342
Other sources.			
Net receipts	24,849	11,251	13,598
Profit for month	$956,955	$897,015	$59,940
Profit from Dec. to date..	$7,728,610	$7,054,493	$674,117

The statement of the Philadelphia & Reading Coal & Iron Co. for the same period shows: Gross receipts, $2,097,115; increase, $348,894; gross expenses, $2,186,657; increase, $364,717; gross receipts to Sept. 30, $14,808,402; increase, $1 076,7 6; gross expenses to Sept. 30, $15,646,-026; increase, $727,776.

Sinaloa & Durango.—Edward D. Adams, of Boston, has organized an English company with an authorized stock capital of $30,000 per mile and subject to a mortgage of $30,000 per mile, of which £108,140 stock is issued to take over the Sinaloa & Durango Railroad Company, Limited. The company offers to pay $540,680 in its stock at par to the road, and already 89 per cent. of the subscribers have deposited their receipts in accordance with the offer. The capital stock of the new company is £231,000.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Oct. 29, 1890.

Trouble has been brewing for some time between the Union Pacific and the Chicago-Omaha lines, over the demand of the former for increased percentages on through business. The other lines in the Western Freight Association have all along refused to grant the demand of the Union Pacific, and have now issued a notice that, taking effect Nov. 1, all percentages and divisions with the Union Pacific via Omaha will be withdrawn, and local rates charged. This means that the other lines will exchange with the Union Pacific as little traffic as possible, leaving it entirely dependent upon its ally, the Chicago & Northwestern. Under the rules of the Western Freight Association, the Northwestern, as well as the other roads, must comply with this notice. If it does this it must break its traffic contract with the Union Pacific. The only alternatives are for it to withdraw from the association, or secure the withdrawal of the demands of the Union Pacific.

The Trans-Continental Association is considering a proposition to withdraw the low rate round-trip tourist tickets to the Pacific Coast. Indications are that the proposition will not be agreed to.

There is considerable friction in carrying out the proposed withdrawal of second class tickets between Chicago and St. Paul, and charges are made of lack of good faith on the part of some of the lines in entering into the agreement to withdraw these tickets Nov. 1. The Minneapolis & St. Louis has refused to become a party to the agreement, unless all lines consent to submit to the Chairman of the Western Passenger Association a statement of outstanding tickets.

The Joint Rate Committee of the Central Traffic Association have fully investigated the charge made against the Panhandle of manipulating the rate on coke last summer, and have exonerated that line from complicity in the manipulation. The case in question, which was noted in my letter of July 30, was the manipulation of the rate on a number of shipments of coke consigned to the Illinois Steel Co. at Joliet, via the Panhandle and Chicago & Alton. The rate to Joliet was the Chicago rate of $2.75 per ton, while the Chicago proportion of the through rate was but $2.35. The coke was stopped at Chicago and delivered at the yard of the steel company and only $2.35 per ton collected.

The adjourned meeting of the Southwestern lines was held yesterday and was attended by representatives of all the lines in interest. It was voted to continue in force the present agreement providing for a distribution and equalization of tonnage by the Board of Chairmen until Dec. 1, after which date any line can give 30 days' notice of withdrawal if it so desires.

Traffic Notes.

Large shipments of apples are moving East from southwestern Missouri points.

Several ticket brokers at Dallas, Tex., have been fined $100.10 each for violation of the city ordinance requiring a $500 license. The odd dime is put on to enable the defendants to appeal to a higher court.

The Kansas City, Wyandotte & Northwestern has grown tired of its experiment of maintaining a local passenger rate of 2 cents a mile, and has announced its intention of restoring the rate to 3 cents a mile.

S. R. Callaway, president of the Toledo, St. Louis & Kansas City, says his company has made a traffic agreement with the Missouri Pacific for business to and from Kansas City, and also has established a line of steamers between Toledo and Buffalo.

A report presented at the meeting of the American Humane Association at Nashville, Tenn., last week says that there are in use west of Chicago about 8,000 improved cattle cars. This would apparently be nearly one-half of all the stock cars in use on the prominent roads in that territory, and it is therefore a matter of doubt what classes of cars are included in the term "improved."

The large coal mines of Colorado and Wyoming have had to greatly curtail production on account of the scarcity of cars, and the newspapers say that many of the miners' families are on the point of starvation. The railroad officers say that the people in the cities and large towns are improvident, and do not order their coal until late in the season, and then so many of them send in orders at once that it is utterly impossible to provide cars.

The three steamships building in England for the Canadian Pacific Railway Co.'s trans-Pacific line will be ready for service in three or four months. The first one, "Empress of India," will sail from Liverpool for Hong Kong about Jan. 15, and will at the latter place take her place in the line. The other ships will follow about one or two months later, respectively, and in connection with these voyages the Canadian Pacific announces tickets for a trip around the world at $800, including meals and berth. The passenger is allowed his own choice of trans-Atlantic lines.

The Interstate Commerce Commission.

A decision was published Oct. 27 in the case of George Rice against the Southern Pacific Company, the Union Pacific, the Atchison, Topeka & Santa Fe and others, in reference to rates on petroleum and its products to California points, as affected by the long and short haul clause of the act to regulate commerce. The decision is in favor of the railroads, and maintains that they have a right to make lower rates to California water and terminal points to meet the competition of water lines without reducing their rates to intermediate points. The decision also sustains the carriers in making a group rate on this traffic, being a through rate that is the same to California points from all points in the United States east of the ninety-seventh meridian.

The decision states that the other claim of the complainant that the defendant rail-carriers make low rates to receiving tank stations in California to favor the Standard Oil Trust and its affiliated companies, and then low local rates from such receiving tank stations to adjacent points, whereby a preference is given these shippers over other shippers, is not sustained by the evidence. As to the transcontinental lines, the complaint is dismissed, but is held for further investigation in the case of certain Southern and Southwestern roads, who are also defendants.

On Oct. 23 the Commission announced its decision in the case of the Harvard Co., of Canton, O., complainant, against the Pennsylvania Co. and eleven other roads. This case involved the rates on surgical chairs, and the decision was in favor of the Harvard Co. The order of the Commission is that the present rate be reduced on surgical chairs in less than carloads from double first class to first class. This was what the rate was formerly for a long period of time, and until recently, when it was advanced to double first class under the analogy clause of the classification.

A Texas Boycott.

The Texas branch of the Commercial Travelers' Protective Association have instituted a boycott against the San Antonio & Aransas Pass, because of the refusal of that road to "conform to the system of all other roads in Texas" and sell 2,000-mile tickets to drummers at reduced rates. Receiver Yoakum has mailed inquiries to all passenger agents in Texas, asking them if it is true that they sell 2,000 mile tickets at two cents a mile, and pointing out to them the provision in the statutes of Texas that tickets cannot be sold for less than three cents a mile. Mr. Yoakum says he is exceedingly anxious to retain the good will and business of the drummers, but he can't see how his road can act in exact contradiction to the laws of Texas without suffering the attending punishment, and wants to learn how other roads of the State have so successfully evaded the law.

Prospects of Uniform Classification.

Chairman Midgley of the Western Freight Association says:

"There seems no doubt that the new uniform classification will become operative on all roads in the United States in the early spring. All the associations but the trunk lines and Southern asscciations have given it their indorsement, and these two will undoubtedly vote in favor of it during November; the Chicago Board of Trade and the Chicago Freight Bureau favor it unqualifiedly. Almost every member of the Interstate Commerce Commission has written me a personal letter of congratulation over the progress made, and it is directly in line with resolutions passed at the annual meetings of all Western state railroad commissioners declaring in favor of uniform classification. Of course, it is subject to amendment when it is in the hands of the permanent committee, but I believe every one will be satisfied that it is a distinct advancement. It is not a new classification. It simply unifies the three existing ones."

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Oct. 25, amounted to 68,037 tons, against 67,363 tons during the preceding week, an increase of 674 tons, and against 70,166 tons during the corresponding week of 1889, a decrease of 2,129 tons. The proportions carried by each road were:

	W'k to Oct. 25.		W'k to Oct. 18.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	9,015	13.2	8,057	11.9
Wabash	3,337	4.9	3,050	4.7
Lake Shore & Michigan South.	11,343	16.7	10,211	15.1
Pitts., Ft. Wayne & Chicago	6,6?0	9.7	6,906	10.2
Chicago, St. Louis & Pitts.	10,421	15.3	10,469	15.5
Baltimore & Ohio	3 661	5 4	4,322	6 4
Chicago & Grand Trunk	8,690	12.8	8,362	12.4
New York, Chic. & St. Louis	7,594	11.2	9,269	13.8
Chicago & Atlantic	7,346	10.8	6,717	10.0
Total	68,037	100.0	67,363	100.0

Of the above shipments 2,041 tons were flour, 26,879 tons grain, 2,437 tons millstuffs, 5,969 tons cured meats, 2,321 tons lard, 9,424 tons dressed beef, 1,222 tons butter, 1,772 tons hides, 215 tons wool, and 7,212 tons lumber. The three Vanderbilt lines together carried 41.1 per cent., while the two Pennsylvania lines carried 25.0 per cent.

During the week the lake lines carried but 54,938 tons, against 77,950 tons during the preceding week. Of the shipments 3,465 tons were flour and 41,312 tons grain.